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Index Volume 4 — 1973-74

- Accounting Data; Portfolio Theory, Corporate Objectives and the Disclosure of; Simon M. Keane. 210
- Accounting Income: Asset Valuation, Income Measurement and; G. Whittington. 96
- Accounting Reports; The Objectives of Published; Bryan Carsberg, Anthony Hope, R. W. Scapens. 162
- Accounting Research 1960-1970: A Critical Evaluation*, edited by Nicholas Dopuch and Lawrence Revsine. Reviewed by Peter Bird. 315
- Accounting Standards Steering Committee; Financial Information and; J. Fisher. 275
- Asset Classification and Asset Valuation; R. G. Walker. 286
- Asset Valuation; The Enterprise Value Concept of; C. J. Warrell. 220
- Asset Valuation, Income Measurement and Accounting Income; G. Whittington. 96
- Asset Valuations before and after Liquidation; D. A. R. Forrester. 33
- Asset Values: Determinants of Second-Hand; Carl R. Beidleman. 102
- Auditing Standards; Bruce G. Picking. 60
- Bailey, D. T.; Biographical Note. 79
- Bailey, D. T.; Enterprise Accounting in the USSR. 43
- Bank Loans and Small Business Financing in Britain; R. E. V. Groves and R. Harrison. 227
- Barnea, Amir; Biographical Note. 239
- Barnea, Amir and Harold Bierman Jr.; Cash Flow Valuation and Depreciation. 193
- Barron, Michael J.; Biographical Note. 239
- Barron, Michael J.; Marginal Costing and Linear Programming: Extension and Synthesis. 197
- Behavioural Aspects of the Inflation Accounting Controversy; Thomas W. McRae and Richard Dobbins. 135
- Beidleman, Carl R.; Biographical Note. 159
- Beidleman, Carl R.; Determinants of Second-Hand Asset Values. 102
- Bierman, Harold; Biographical Note. 239
- Bierman Jr., Harold and Amir Barnea; Cash Flow Valuation and Depreciation. 193
- Bird, Peter; review of *Accounting Research 1960-1970: A Critical Evaluation*, edited by Nicholas Dopuch and Lawrence Revsine. 315
- Bird, Ron; Biographical Note. 159
- Bird, Ron; A Reappraisal of the Share Price Maximisation Criterion. 127
- Bloomfield, E. C. and R. Ma; The Lease Evaluation Solution. 297
- Bloomfield, E. C.; Biographical Note. 319
- Capitalisation Issues; Shareholder Behaviour attendant upon; Michael Firth. 23
- Carsberg, Bryan V.; Biographical Note. 239
- Carsberg, Bryan; review of *Costs and Potential Economies: Studies in Institutional Management in Higher Education (OECD 1972)*. 157
- Carsberg, Bryan; Anthony Hope, R. W. Scapens; The Objectives of Published Accounting Reports. 162
- Cash Flow Valuation and Depreciation; Amir Barnea and Harold Bierman Jr. 193
- Charlton Mills, 1810-1889; An Early English Cotton Mill Cost Accounting System; Williard E. Stone. 71
- Cash Management; Using Computers in Small Company; C. A. Rands, R. Vause and K. G. Pemberton. 251
- Company Prospects; Statements of; Susan Dev. 270
- Computers; Using in Small Company Cash Management; C. A. Rands, R. Vause and K. G. Pemberton. 251
- Consumer Durables Manufacturing Industry: Stock Valuation Practices in; B. C. Dangerfield and E. Stephenson. 2
- Cost Accounting System; An Early English Charlton Mills 1810-1889; Williard E. Stone. 71
- Costs and Potential Economies: Studies in Institutional Management in Higher Education (OECD 1972)*. Reviewed by Bryan Carsberg. 157
- Dangerfield, B. C.; Biographical Note. 79
- Dangerfield, B. C. and Stephenson, E.; Stock Valuation Practices in Consumer Durables Manufacturing Industry. 2
- Debt; Illusory Holding Gains on Long Term; John R. Perrin. 234
- Deprival Value: Its Use and Abuse; Graeme Macdonald. 263
- Determinants of Second-Hand Asset Values; Carl R. Beidleman. 102
- Dev, Mrs. Susan; Biographical Note. 319
- Dev, Susan; Statements of Company Prospects. 270
- Dobbins, Richard and McRae, Thomas W.; Behavioural Aspects of the Inflation Accounting Controversy. 135
- Dobbins, Richard; Biographical Note. 159
- Dopuch, Nicholas and Revsine, Lawrence; *Accounting Research 1960-1970*, reviewed by Peter Bird. 315.
- Drucker, Peter F.; *Management: Tasks, Responsibilities, Practices*; reviewed by Trevor Gambling. 317
- Egginton, Don; review of *Financial Planning in Divisional Companies by Cyril Tomkins*. 238
- Enterprise Accounting in the USSR; D. T. Bailey. 43
- Enterprise Income: Survival or Decline and Fall?; T. A. Lee. 178
- Enterprise Value Concept of Asset Valuation; The; C. J. Warrell. 220
- Equity Accounting and Investment Value: Another View; D. Maund and G. R. Young. 207
- European Company Law Texts Edited and Introduced by Professor Clive M. Schmitthoff*; Review. 318

WINTER 1974

- Financial Information and the Accounting Standards Steering Committee; J. Fisher. 275
- Financial Management in Local Government; A. H. Marshall.* Reviewed by M. F. Stonefrost. 316
- Financial Planning in Divisional Companies; Cyril Tomkins.* Reviewed by Don Egginton. 238
- Firth, Michael; Biographical Note. 79
- Firth, Michael; Shareholder Behaviour attendant upon Capitalisation Issues. 23
- Fisher, James; Biographical Note. 319
- Fisher, J.; Financial Information and the Accounting Standards Steering Committee. 275
- Forrester, David; Biographical Note. 79
- Forrester, D. A. R.; Asset Valuations before and after Liquidation. 33
- Gambling, Trevor; review of *Human Asset Accounting; W. J. Giles and D. Robinson.* 237
- Gambling, Trevor; review of *Management: Tasks, Responsibilities, Practices; Peter F. Drucker.* 317
- General Purchasing Power? Why Use; Reg S. Gynther. 141
- Giles, W. J. and Robinson, D.; *Human Asset Accounting,* reviewed by Trevor Gambling. 237
- Groves, Roger E. V.; Biographical Note. 239
- Groves, R. E. V.; and R. Harrison; Bank Loans and Small Business Financing in Britain. 227
- Gynther, Reg S.; Biographical Note. 159
- Gynther, Reg S.; Why Use General Purchasing Power? 141
- Harrison, Robert; Biographical Note. 239
- Harrison, R.; and R. E. V. Groves; Bank Loans and Small Business Financing in Britain. 227
- Holding Gains; Illusory on Long Term Debt; John R. Perrin. 234
- Hope, Anthony; Biographical Note. 240
- Hope, Anthony; Bryan Carsberg, R. W. Scapens; The Objectives of Published Accounting Reports. 162
- Hospital Investment Evaluation; Edward J. Lusk. 303
- Human Asset Accounting; W. J. Giles and D. Robinson.* Reviewed by Trevor Gambling. 237
- Income Measurement: Asset Valuation, and Accounting Income; G. Whittington. 96
- Inflation Accounting Controversy: Behavioural Aspects of the; Thomas W. McRae and Richard Dobbins. 135
- Interfirm Comparison Schemes: Some Difficulties Facing Organisers of; John Sizer. 116
- Investment Value; Equity Accounting and: Another View; D. Maund and G. R. Young. 207
- Keane, Simon M.; Biographical Note. 240
- Keane, Simon M.; Portfolio Theory, Corporate Objectives and the Disclosure of Accounting Data. 210
- Lease Evaluation Solution; The; E. C. Bloomfield and R. Ma. 297
- Lee, T. A.; Biographical Note. 240
- Lee, T. A.; Enterprise Income: Survival or Decline and Fall? 178
- Linear Programming; Marginal Costing and: Extension and Synthesis; Michael J. Barron. 197
- Liquidation; Asset Valuations before and after; D. A. R. Forrester. 33
- Long Term Debt; Illusory Holding Gains on; John R. Perrin. 234
- Lusk, Edward J.; Biographical Note. 319
- Lusk, Edward J.; Hospital Investment Evaluation. 303
- Ma, Ronald; Biographical Note. 319
- Ma, R. and E. C. Bloomfield; The Lease Evaluation Solution. 297
- Macdonald, Graeme; Biographical Note. 320
- Macdonald, Graeme; Deprival Value: Its Use and Abuse. 263
- Mallinson, A. H.; Biographical Note. 160
- Mallinson, A. H.; A Risk Analysis Approach to Profits Forecasts. 83
- Management: Tasks, Responsibilities, Practices; Peter F. Drucker.* Reviewed by Trevor Gambling. 317
- Marginal Costing and Linear Programming: Extension and Synthesis; Michael J. Barron. 197
- Marshall, A. H.; *Local Government.* Reviewed by M. F. Stonefrost. 316
- Maund, D. M.; Biographical Note. 240
- Maund, D.; and G. R. Young; Equity Accounting and Investment Value: Another View. 207
- Most, K. S.; Biographical Note. 320
- Most, Kenneth S.; A Comparative Study of the Accounts of Seven Major Oil Companies. 242
- McNally, Graeme M.; Biographical Note. 79
- McNally, G. M.; Profit Centres and Transfer Prices – are they necessary? 13
- McRae, Thomas W., and Richard Dobbins; Behavioural Aspects of the Inflation Accounting Controversy. 135
- McRae, T. W.; Biographical Note. 160
- (OECD 1972) *Studies in Institutional Management in Higher Education; Costs and Potential Economies.* Reviewed by Bryan Carsberg. 157
- Oil Companies; A Comparative Study of the Accounts of Seven Major; Kenneth S. Most. 242
- Pemberton, K. G.; Biographical Note. 320
- Pemberton, K. G.; C. A. Rands, R. Vause; Using Computers in Small Company Cash Management. 251
- Perrin, John R.; Biographical Note. 240
- Perrin, John R.; Illusory Holding Gains on Long Term Debt. 234
- Picking, Bruce Gordon; Biographical Note. 80
- Picking, Bruce G.; Auditing Standards. 60
- Portfolio Theory, Corporate Objectives and the Disclosure of Accounting Data; Simon M. Keane. 210
- Production Runs; Sub-optimal: a case study; D. G. Rhys. 174
- Profit Centres and Transfer Prices – are they necessary?; G. M. McNally. 13
- Profits Forecasts; A Risk Analysis Approach to; A. H. Mallinson. 83
- Published Accounting Reports; The Objectives of; Bryan Carsberg, Anthony Hope and R. W. Scapens. 162
- Purchasing Power? Why Use General; Reg S. Gynther. 141
- Rands, C. A.; Biographical Note. 320
- Rands, C. A.; R. Vause, K. G. Pemberton; Using Computers in Small Company Cash Management. 251
- Rhys, David Garel; Biographical Note. 240

ACCOUNTING AND BUSINESS RESEARCH

- Rhys, D. G.; Sub-optimal Production Runs: a case study. 174
Reappraisal of the Share Price Maximisation Criterion; Ron Bird. 127
- Scapens, R.; Biographical Note. 240
Scapens, R. W.; Bryan Carsberg, Anthony Hope; The Objectives of Published Accounting Reports. 162
Shareholder Behaviour attendant upon Capitalisation Issues; Michael Firth. 23
Share Price: A Reappraisal of the Maximisation Criterion; Ron Bird. 127
Sizer, John; Biographical Note. 160
Sizer, John; Some Difficulties Facing Organizers of Interfirm Comparison Schemes. 116
Small Business Financing in Britain; Bank Loans and; R. E. V. Groves and R. Harrison. 227
Stephenson, E.; Biographical Note. 80
Stephenson, E.; and Dangerfield, B. C.; Stock Valuation Practices in Consumer Durables Manufacturing Industry. 2
Stock Valuation Practices in Consumer Durables Manufacturing Industry; B. C. Dangerfield and E. Stephenson. 2
Stone, Williard E.; Biographical Note. 80
Stone, Williard E.; An Early English Cotton Mill Cost Accounting System: Charlton Mills, 1810-1889. 71
Stonefrost, M. F.; review of *Financial Management in Local Government*; A. H. Marshall. 316
Sub-optimal Production Runs: a case study; D. G. Rhys. 174
- Tomkins, Cyril; *Financial Planning in Divisional Companies*. Reviewed by Don Egginton. 238
Transfer Prices; Profit Centres and; - are they necessary?; G. M. McNally. 13
- USSR; Enterprise Accounting in; D. T. Bailey. 43
- Vause, R.; Biographical Note. 320
Vause, R.; C. A. Rands, K. G. Pemberton; Using Computers in Small Company Cash Management. 251
- Walker, R. G.; Biographical Note. 320
Walker, R. G.; Asset Classification and Asset Valuation. 286
Warrell, C. J.; The Enterprise Value Concept of Asset Valuation. 220
Whittington, Geoffrey; Biographical Note. 160
G. Whittington; Asset Valuation, Income Measurement and Accounting Income. 96
Why Use General Purchasing Power?; Reg S. Gynther. 141
- Young, G. R.; Biographical Note. 240
Young, G. R.; and D. Maund; Equity Accounting and Investment Value: Another View. 207

Contents

Editorial		2
Allocating Service Departments' Costs: Methodology and Case Study	Lawrence A. Gordon	3
Institutional Shareholders in the UK Equity Market	Richard Dobbins	9
Investment Criteria for EDP Systems	A. D. Chambers	18
Relative Company Risk Over Time	Haim Falk James A. Heintz	25
A Model for Accounting for Inflation	A. M. C. Morison	41
A Note on Stock Dividends	Adrian Buckley	53
The Informational Value of Replacement Cost Accounting for External Company Reports	Boris Popoff	61
The Objectives of Published Accounting Reports: A Comment	K. V. Peasnell	71
Book Reviews		77
Notes on Contributors to this issue		79

Editorial

The costs of production of *Accounting and Business Research* have outrun the subscription income of the journal. It has therefore been reluctantly decided that the annual subscription rate must be increased to £10, commencing with issue No. 18 (Spring 1975). Current subscriptions will continue at the old rates until renewal.

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Allocating Service Departments' Costs: Methodology and Case Study

Lawrence A. Gordon

Introduction

In recent years the problem of allocating service departments' costs to producing departments has received much attention in business and academic circles. Of particular interest has been the application of matrix theory to the allocation of service departments' costs where reciprocal distributions are required. Williams and Griffen¹ were the first to popularise the matrix approach to such a problem.² Holmes^{3,4} was also among the early writers on the matrix approach to allocating reciprocal service departments' costs. Minch and Petri⁵ are among the more recent authors to discuss the same subject.

The previous authors writing on the subject of

¹Williams Thomas H. and Charles H. Griffen - 'Matrix Theory and Cost Allocation', *The Accounting Review* (July, 1964), pp. 671-678.

²Briefly stated their example necessitated solving the following set of simultaneous equations using matrix theory:

$$\begin{array}{l} X_1 - .05X_2 - .10X_3 - .20X_4 = 8,000 \\ X_2 - .10X_1 - .05X_3 - .20X_4 = 12,000 \\ -.10X_1 - .10X_2 + X_3 - .05X_4 - .20X_5 = 6,000 \\ -.05X_1 - .10X_2 + X_4 - .20X_5 = 11,000 \\ -.10X_1 - .10X_2 - .05X_3 + X_5 = 13,000 \end{array}$$

where X_1, \dots, X_5 equal the total service departments' costs, for five respective service departments, after reciprocal distributions.

(or in matrix terms)

$$\begin{bmatrix} 1 & 0 & -.05 & -.10 & -.20 \\ 0 & 1 & -.10 & -.05 & -.20 \\ -.10 & -.10 & 1 & -.05 & -.20 \\ -.05 & 0 & -.10 & 1 & -.20 \\ -.10 & -.10 & -.05 & 0 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \\ X_5 \end{bmatrix} = \begin{bmatrix} 8,000 \\ 12,000 \\ 6,000 \\ 11,000 \\ 13,000 \end{bmatrix}$$

³Holmes, Geoffrey A., 'Apportionment of Overheads - The Problem of Reciprocal Service Departments - Mathematical Solutions - I', *Accountancy* (December, 1967), pp. 812-814.

⁴Holmes, Geoffrey A., 'Apportionment of Overheads - The Problem of Reciprocal Service Departments - Mathematical Solutions - II', *Accountancy* (January, 1968), pp. 30-33.

⁵Minch, Roland, and Enrico Petri, 'Matrix Models of Reciprocal Service Cost Allocation', *The Accounting Review* (July, 1972), pp. 576-580.

reciprocal distributions have assumed that the percentages for distributing the service departments' costs, needed for obtaining the matrix of coefficients of the simultaneous equations, were known, or easily derived, and proceed from there. However, the problem of determining the proper percentages is far from solved, and in fact is more crucial than the problem of reciprocal distributions. The common method for determining the percentages needed to allocate service departments' costs, and any other indirect expenses, is to find a single common denominator (base), such as direct labour hours. However, this method, hereafter referred to as the 'single base method', is a naive approach, since in reality these costs are often a function of several variables. Thus, this paper will discuss and illustrate a 'multiple base approach' for determining the percentages needed in allocating service costs. The methodology will be that of using a multiple regression analysis model. The use of regression analysis will serve two purposes. In the first place, it will give a more accurate allocation of the costs, and secondly, will provide an additional means of budgeting and control.⁶

General approach

A regression analysis approach to allocating costs originates with estimating the appropriate cost functions. Estimating cost functions, which falls under the branch of economics referred to as econometrics, can be accomplished by either a direct cost estimation, or by first estimating the appropriate production functions and transforming them to cost functions. The direct estimation procedure is often easier and will be the method chosen for this paper.

⁶Multiple regression analysis has been used elsewhere in accounting for such purposes as cost control, forecasting revenues, and assigning costs to joint products. However, little more than lip service has been paid to the use of this technique in allocating service departments' costs.

Total short-run costs, which are the sum of total variable cost plus total fixed costs, are traditionally depicted as shown in Figure 1. From this curve the standard cost curves for marginal costs, average variable costs, average fixed costs, and total average costs can easily be derived. Although these traditional cost curves usually do not represent the real world, they do serve as a basic framework for considering how service department costs should be allocated. Of course, since in the long-run there are no fixed costs by definition, graphs of this nature do not apply to the long-run. However, it seems valid to restrict our discussion to the short-run in the light of the fact that all economic events occur in this time period.

The method of using regression analysis to allocate service departments' costs is most easily seen in the context of a general problem. Consequently, assume we have one service department, S_1 , and two producing departments, P_1 and P_2 .⁷ Furthermore, assume that the service department is for plant maintenance. In looking for a base to distribute the service departments' costs to the producing departments, it was determined that the maintenance costs are a function of the number of machines (for illustrative purposes, assume that all machines are identical) and the number of man-hours worked within the producing departments.⁸ It is decided to allocate the maintenance departments' costs through a 'multiple base'; i.e., two variables - man-hours and number of machines.⁹ Therefore, we would collect data, for several periods,

⁷The following generalised procedure will be further illustrated in the specific case study which follows this section.

⁸Admittedly this is an over-simplified example. However, once the principles are understood, generalising to a more complex situation will be apparent.

⁹These two variables relate to the variable portion of the maintenance costs, whereas a third 'base' will be used to allocate the fixed portion.

for the three variables involved.

Where:

Dependent variable = Y = Maintenance Department Costs.

Independent variables = X_1 = Total number of machines for producing departments No. 1 and No. 2.

X_2 = Total number of man hours worked in producing departments No. 1 and No. 2.

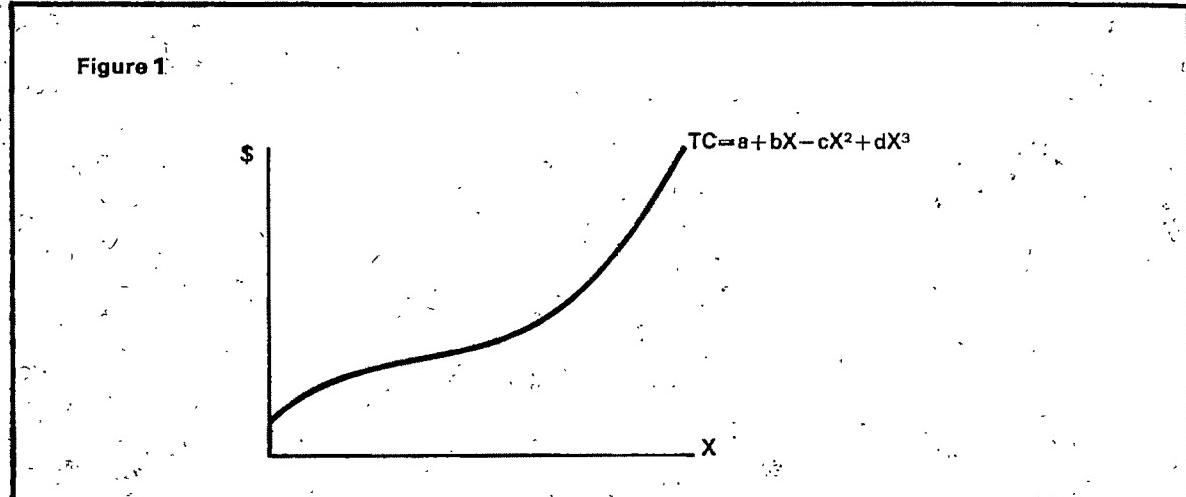
Our next step would be to solve the regression equation, which for this basic example we will assume turns out to be a multiple linear equation of the form:

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2$$

Now we are in a position to allocate the maintenance departments' costs. First, we assign costs by multiplying the variable coefficients by the respective number of machines and man-hours worked, or estimated if a standard cost system is used, for each department. Secondly, the b_0 portion of the equation could be distributed to the departments according to a constant base, such as square feet. These allocations are obviously estimates since they are based on the regression equation. However, the fact that we are dealing with estimates affords us a control device by checking if our total estimate, \hat{Y}_1 , is significantly different from our actual maintenance cost, Y_1 . This difference, $Y_1 - \hat{Y}_1$, is the predictive error and would not be allocated, but rather would be treated as a variance along the same lines that we treat variances under a standard cost system.

If there are several service departments providing a service to each other, as well as to the producing departments, we have reciprocal distributions to consider. This would be accomplished by first

Figure 1



computing the amounts distributed to the various departments via each service department's cost function. Next, we would divide the total costs allocated by each service department into the amount allocated to individual producing and service departments, so as to determine the appropriate percentages (see specific illustration). Once this is accomplished, we could proceed to use matrix theory to solve the reciprocal relationships between service departments.

If the model is non-linear, we would have to transform it so as to have a separable function; that is, a total cost written as the sum of functions of the individual variables.¹⁰ Ostensibly this would require solving for new coefficients based on our new model. For purposes of this paper, cost functions will be considered linear either initially or after an appropriate transformation; i.e., a log transformation.¹¹

Specific illustration¹²

L. Manufacturing Company has two producing departments, P_1 , and P_2 , and one service department - power department. Recently, it has been brought to the president's attention that the allocation of the power department's costs, which account for a significant portion of overhead, have been the subject of heated debates between producing department managers and senior management. Consequently, a careful review of the allocation of these costs to the producing departments has been undertaken. The following facts were revealed:

- (1) Total costs of the power (service) department were allocated to the two producing departments based on the monthly average number of employees in each department. The allocation of the actual expense has been handled on a monthly basis.
- (2) The major uses of the power department's facilities fall into the following categories:
 - (a) machine usage
 - (b) number of employees using the machines
 - (c) general lighting.

Based on the information derived from the study, it was decided that the power costs are primarily a function of the total number of machine hours worked

¹⁰The need for this transformation is readily seen by noting that $bX^2 \neq [b\left(\frac{X}{2}\right)^2 + b\left(\frac{X}{2}\right)^2]$. On the other hand, in the linear case $bX = b\left(\frac{X}{2}\right) + b\left(\frac{X}{2}\right)$.

¹¹For example, $Y = X^2$ can be rewritten as $\log Y = \log X + \log X$. Of course, if an appropriate transformation cannot be made, then the method of summing the variable values for the two producing departments breaks down. In this latter case, an alternative model, such as proposed in the Appendix to the following case study, must be used.

¹²The illustration is adapted from an actual study in which the author was involved.

and the average number of workers. In regression terms, the following cost function for power was hypothesized:

$$Y_1 = B_0 + B_1 X_{11} + B_2 X_{21} + E_1$$

or

$$\hat{Y}_1 = b_0 + b_1 X_{11} + b_2 X_{21}$$

where, Y_1 = costs (in \$1000) of power (service) department

X_{11} = average number of employees per month

X_{21} = total number of machine hours worked per month (in 100's).

Solving for the 'least squares' estimates, based on the data shown in Table A, resulted in the following model:

$$\hat{Y}_1 = 1.85185 + .01218X_{11} + .02892X_{21}$$

These results can be seen in Anova I. Note the significant values of the Adjusted R² and the computed 't' values for the coefficients.¹³ Furthermore, plots of the residuals (see Figures 2 and 3) were made to check the standard assumptions of the 'least squares' model.¹⁴ These assumptions did not appear to be violated, therefore, the cost function was accepted for future allocations of power costs to the producing departments.¹⁵

Anova I

Variable	Reg. Coef.	Std. Error Coef.	Computed 't'
1	0.01218	0.00376	3.23718
2	0.02892	0.00993	2.91243
Intercept			1.85185
Multiple Correlation			0.95878 (Adjusted R = 0.95687)
Std. Error of Estimate			0.32236 (Adjusted SE = 0.32961)

Analysis of variance for the regression

Source of variation	DF	Sum of SQ	Mean SQ	F value
Attributable to regression	2	24.848	12.424	119.555
Deviation from regression	21	2.182	0.104	
Total	23	27.030		

The significance of the change in allocation policy can be seen by comparing the amounts allocated to P_1 and P_2 for the last month under the old and new methods:

¹³The coefficients b_1 and b_2 multiplied by the amount of the respective variables for each department represent the variable portion of the cost of power, whereas b_0 can be thought of as the fixed portion. The separation of these costs into variable and fixed portions will of course be useful for decision making purposes. However, if multicollinearity exists one should not refer to the marginal cost related to each variable. Also, treating b_0 as fixed is dependent on the assumption that the equation is applicable when variables X_1 and X_2 are zero.

¹⁴Also, as an additional check, a 'first difference'-model was considered to see if first order autocorrelation was prevalent in the data. The results of this latter check were negative.

¹⁵See Appendix for consideration of an alternative allocation model.

	<i>Old</i> ¹⁶			<i>New</i> ¹⁷			
	Total	P1	P2	Variable	Total	P1	P2
				Fixed	7,124	3,851	3,273
	8,800	4,400	4,400		8,976	4,777	4,199
	100%	50%	50%		100%	53%	47%

Figure 2 Overall Plot of Residuals

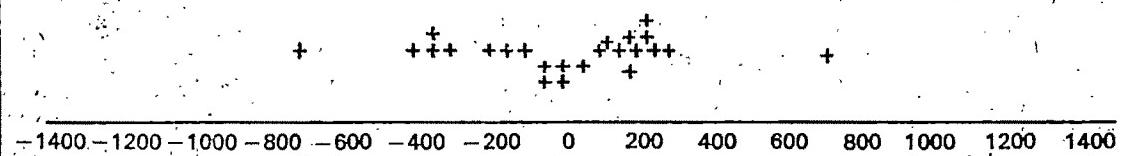
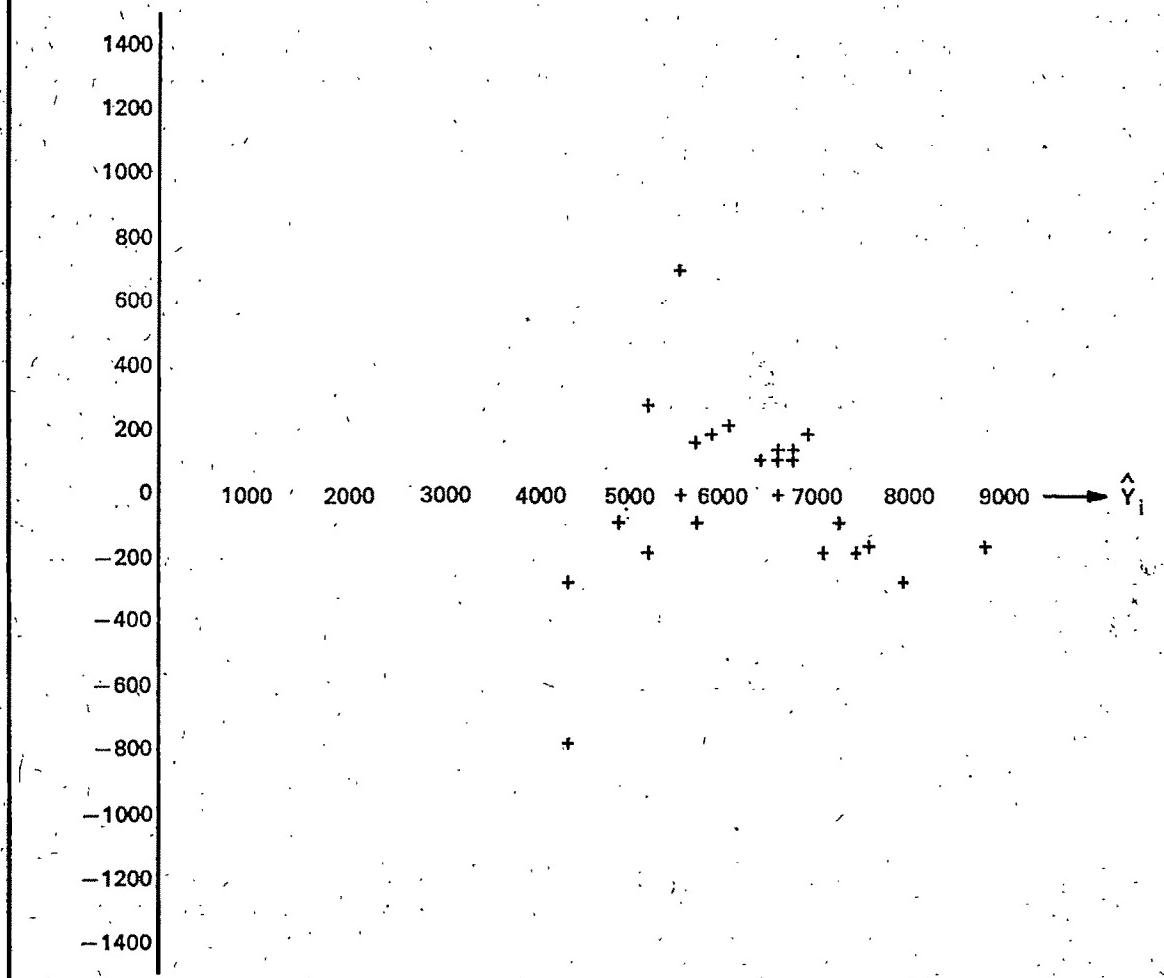
Figure 3 Residuals Plotted Against \hat{Y}_1 

TABLE A¹⁸

Y Total power ¹⁹ Costs (\$000)	Average number of X1 = employees				Number of X2 = machine hours			
	Dept. P1		Dept. P2		(in hund- reds)		Dept. P1	Dept. P2
4.0	140	65	75		40	19	21	
4.5	140	68	72		44	21	23	
5.0	150	75	75		48	24	24	
6.5	200	90	110		52	27	25	
5.0	163	75	78		58	29	29	
6.0	168	78	90		60	30	30	
5.8	169	79	90		65	32	33	
5.8	176	85	90		65	33	32	
6.3	183	89	94		70	36	34	
6.4	188	90	98		71	36	35	
6.6	197	95	102		72	37	35	
6.7	211	98	113		73	38	35	
6.8	214	100	114		74	38	36	
6.8	219	103	116		74	37	37	
6.9	222	105	117		75	37	38	
7.0	231	106	125		78	38	38	
6.7	210	104	106		79	41	38	
7.5	241	114	127		83	42	41	
7.3	261	121	130		85	43	42	
7.4	260	130	130		89	45	44	
7.6	270	136	134		90	45	45	
7.6	290	150	140		90	45	45	
6.9	260	130	120		82	42	40	
8.8	300	150	160		120	70	50	

The above comparison points out that the new method does not allocate the actual cost of power. The difference, the residual, can be tested for significance and treated in the same manner as are variances under a standard cost system. One way of checking the residual for significance is by looking at the unit normal deviate. If monthly residuals appear significant, this would indicate that further investigation of the various variables is warranted. Even if the

residuals seem in order, monitoring the model, on a regular basis, should be an integral part of such an allocation approach.

Conclusion

Cost allocations aid the accountant in product costing, budgeting, and pricing decisions. The accuracy of these allocations determines their ultimate usefulness. In this paper, it has been argued that an econometric approach to allocating service department costs improves the desired accuracy. Furthermore, a regression model results in a separation of total costs into fixed and variable costs, thereby aiding in the development of flexible budgets, as well as providing an additional control device. Although not a panacea, it is clear, at least to this author, that econometrics applied to cost allocation problems warrants serious further exploration.

Appendix

The specific illustration presented in this paper has implicitly assumed that the employees and machine hours of the two producing departments are homogenous as to their impact upon power costs. This assumption accounts for the use of a model which treats the dependent variable as a function of the total independent variables. On the other hand, if this

¹⁶ $P_1 = 150/300 \times 8800 = \$4,400$
¹⁶ $P_2 = 150/300 \times 8800 = \$4,400$
 i.e. The service departments' costs would be distributed as follows: 50% to P₁ and 50% of P₂.

$$\begin{aligned} {}^{17}P_1 &= \frac{1.852}{2} + .01218(150) + .02892(70) = \$4,777 \times \\ &\quad 1000 = \$4,777.00 \end{aligned}$$

$$\begin{aligned} {}^{17}P_2 &= \frac{1.852}{2} + 0.1218(150) + .02892(50) = \$4,199 \times \\ &\quad 1000 = \$4,199.00 \end{aligned}$$

Thus, the percentages would be 53% to P₁ and 47% to P₂. Fixed costs, which can be thought to represent general lighting, are being allocated equally in this illustration based on the assumption that the departments occupy equal floor space.

¹⁸This Table shows the monthly data collected for the past two years. The nature of the company is such that there are no significant seasonal changes in operations, thereby negating the need for considering such effects upon the data.

¹⁹Y can be thought of as equalling $\frac{Y^1}{\$1,000}$, therefore \hat{Y}_1 ($\$1,000$) will equal the actual estimate of power costs.

assumption were not considered valid (or if a non-linear model cannot be appropriately transformed) a different model should have been hypothesized. One such alternative model would be:

$$Y_1 = B_0 + B_1X_{11} + B_2X_{12} + B_3X_{21} + B_4X_{22} + E_1$$

where, X_{11} = average number of employees in P_1

X_{12} = average number of employees in P_2

ACCOUNTING AND BUSINESS RESEARCH

X_{21} = number of machine hours in P_1

X_{22} = number of machine hours in P_2

The results of this model appear in Anova Table below.

Acknowledgement. The author is indebted to Dr. John L. Livingstone for his comments on an initial outline of this paper.

ANOVA TABLE²⁰

Variable	Reg. Coef.	Std. Error Coef.	Computed 't'
X_{11}	-0.01598	0.00758	-2.10690
X_{12}	0.04102	0.00754	5.43622
X_{21}	0.03272	0.01416	2.31175
X_{22}	0.03201	0.02523	1.26876
Intercept	1.34047		
Multiple correlation	0.97861	(Adjusted R = 0.97637)	
Standard error of estimate	0.24535	(Adjusted SE = 0.26311)	
Analysis of variance for the regression			
<i>Source of variation</i>	<i>DF</i>	<i>Sum of SQ</i>	<i>F Value</i>
Attributable to regression	4	25.886	6.472
Deviation from regression	19	1.144	0.060
Total	23	27.030	107.508

²⁰Note that variable X_{11} has a negative coefficient and that the 't' value for variable X_{22} is insignificant. The

negative coefficient is probably due to the fact that X_{11} is acting as a 'suppressor' variable.

Institutional Shareholders in the UK Equity Market

Richard Dobbins

Introduction

This paper presents statistics relating to the equity holdings, stock market equity turnover, portfolio turnover, and portfolio volatility of the four largest groups of institutional shareholders - insurance companies, combined pension funds, investment trust companies and unit trusts - and briefly examines the roles of institutional shareholders as participants in management, resource allocators, portfolio managers, protectors of the small shareholder, and stock market stabilisers. Information presented here at sector level forms the background to more intensive research into the behaviour of investing institutions, particularly into the variability of the equity policies of private, public and local authority pension funds.

Statistics appearing in this article are based on those published in *Financial Statistics*, *The Bank of England Quarterly Bulletin*, *Statistics Relating to Securities Quoted on the London Stock Exchange*, *The Stock Exchange Fact Book*, and *Interest and Dividends upon Securities Quoted on the London Stock Exchange*. Adjustments to published statistics, estimated where necessary, have been made for foreign holdings, overseas sterling holdings, unquoted holdings, holdings not at market value, inconsistent valuation dates, new issues, transactions in foreign, overseas and unquoted equities, and anomalies arising out of inaccurate returns submitted to the Central Statistical Office.

Equity Holdings

Table I shows institutional holdings in UK registered and managed companies at 31st December 1966-1971, and the percentage of total UK equity capitalisation owned by each class of institution and combined institutions. Insurance company holdings, published at book value, are converted to estimated market value by the use of Revell's¹ perpetual

inventory technique. Using Revell's 1961 market valuation of insurance company equity holdings as a starting point, future market values are estimated using the FT-Actuaries All-Share Index, projected backwards using the FT Ordinary Share Index for the period before 10th April 1962 when the All-Share Index first appeared. Net quarterly acquisitions of equities are included assuming that they were purchased at the index quarterly average. Tests of the accuracy of the perpetual inventory method of revaluation carried out on the published market values of equity holdings of investment trusts, unit trusts, public authority, and local authority pension funds suggest that the technique is acceptable. On this basis of valuation it appears that insurance companies are buying slightly less than 1 per cent of all UK equities each year, and at 31st December 1971 held 15.1 per cent of total UK equity capitalisation.

The equity holdings of private pension funds are published at market value but the perpetual inventory method suggests that adjustments should be made to avoid a performance surplus of £87m. for the years 1969/1970 and a shortfall of £446m. for 1967/1968. Having adjusted for these anomalies, it is necessary to apportion total equity market value between UK, overseas sterling and foreign equities on the basis of book values. A similar apportionment is made for insurance companies, but the insignificant overseas sterling and foreign holdings of public authority and local authority pension funds are ignored. In all years 1966 to 1971 the net acquisitions of combined pension funds are greater than insurance company acquisitions. The increase in the equity holdings of combined pension funds 1966 to 1971 is less than the insurance company increase illustrated in Table I. This result is caused by the methods of valuation adopted. The statistics show that combined pension funds have acquired 3 per cent of all UK equities in 5 years, although their net acquisition of equities shows that they are accumulating ordinary shares in greater quantities than are insurance companies. Table I suggests that insurance

¹Revell, Jack R. S., *The Wealth of the Nation*, Cambridge University Press, 1967, and Revell, Jack R. S., 'The Wealth of the Nation', *Moorgate and Wall Street*, Spring 1966.

TABLE I
Institutional Equity Holdings In UK Registered and Managed Companies Quoted on the London Stock Exchange at 31st December (£m)²

	1966	%	1967	%	1968	%	1969	%	1970	%	1971	%
Insurance Companies	2,600	(11.7)	3,366	(11.8)	5,313	(12.9)	4,724	(13.6)	4,595	(14.1)	6,886	(16.1)
Private Pension Funds	1,462	(6.6)	1,920	(6.7)	2,850	(6.9)	2,417	(7.0)	2,341	(7.2)	3,416	(7.6)
Public Pension Funds	421	(1.9)	602	(2.1)	893	(2.2)	828	(2.4)	917	(2.8)	1,484	(3.3)
Local Authority Pension Funds	208	(0.9)	291	(1.0)	485	(1.2)	438	(1.3)	431	(1.3)	754	(1.7)
Investment Trust Companies	1,625	(7.3)	2,158	(7.6)	3,158	(7.6)	2,671	(7.7)	2,462	(7.8)	3,547	(7.8)
Unit Trusts	453	(2.1)	684	(2.3)	1,142	(2.8)	1,095	(3.2)	1,034	(3.2)	1,635	(3.6)
Other Shareholders	15,390	(69.5)	19,555	(88.5)	27,380	(66.4)	22,441	(64.8)	20,718	(63.8)	27,798	(61.0)
Total Market Value	22,149	(100)	28,584	(100)	41,201	(100)	34,614	(100)	32,498	(100)	45,617	(100)
Combined Pension Funds	2,081	(9.4)	2,813	(9.8)	4,228	(10.3)	3,883	(10.7)	3,689	(11.2)	5,654	(12.4)
Combined Institutions	6,759	(30.6)	8,999	(31.6)	13,841	(33.6)	12,173	(35.2)	11,780	(36.2)	17,725	(39.0)

²Statistics presented in Tables I-V are extracted, and updated, from an unpublished dissertation, *Institutional Shareholders in the Equity Market*, submitted by R. Dobbins in part fulfilment for the requirements for the Degree of Master by advanced study in Management and Administration, University of Bradford, June 1971.

companies acquired 3·4 per cent of the value of all UK equities during the 5 year period.

Statistics relating to the market value of equity holdings of investment trust companies and unit trusts are readily available. The high rate of distribution and the inability to raise additional funds by investment trusts is reflected in their stable holdings of all UK equities. The ability of insurance companies, pension funds, and sometimes unit trusts, to raise funds is reflected in their continuously-increasing market share. Combined institutions have increased their holdings of all UK equities from 30·5 per cent in 1966 to 39·0 per cent in 1971, slightly less than 2 per cent per annum. They will apparently hold 50 per cent by 1977. By contrast, other shareholders have necessarily disposed of 8·5 per cent of total UK equities during the 5 years to 31st December 1971.

Table II presents the same trends as Table I, the 31st March market valuations of all UK and overseas sterling equities replacing the 31st December market valuations of UK registered and managed companies. The 31st March statistics again suggest that combined institutions are annually acquiring slightly less than 2 per cent of the market value of UK and overseas sterling equities. Combined institutions owned 37·9 per cent of the total at 31st March 1972, an increase of 8·6 per cent since 31st March 1967. This can be compared with an increase of 8·5 per cent for the 5 years to 31st December 1971 demonstrated in Table I.

Equity Turnover

The increasing market share of total equities by the institutions, has not been matched by a gradually increasing institutional share of total equity market trading. Table III shows the contribution of each major class of institutional investor to total equity turnover, which includes not only UK but also overseas sterling and foreign equity turnover. An increasing market share is only apparent in the public pension funds and unit trust sectors. The range of contribution for combined institutions is 39·4 per cent in 1967 to 45·3 per cent in 1970. In order to obtain comparative statistics for UK equities it is necessary to estimate and deduct foreign and overseas sterling turnover from total turnover. The deduction of foreign and overseas sterling turnover from insurance company and private pension fund turnover can be estimated on the basis of reported share values. It can be ignored as being insignificant for public authority and local authority pension funds. For investment trust companies and unit trusts the figures can be obtained from published

statistics. Making these adjustments yields a range of 38 per cent in 1967 to 43 per cent in 1970, again with no apparent upward swing in the proportion of equity turnover attributable to institutions, other than public authority pension funds and unit trusts.

Portfolio Activity

Institutional portfolio turnover statistics are given in Table IV for the years 1967-1971. Equity purchases plus sales for each year are expressed as a percentage of average equity holdings at market value. From the information illustrated in the table it is apparent that the portfolio turnover rate of insurance companies is persistently below the average market rate. The turnover rate for private and local authority pension funds is greater than the market average in all years, the statistics for local authority funds being more volatile. Combined pension funds trade at approximately the average rate. The portfolio turnover rate for investment trust companies is usually above average and that for unit trusts much greater than average. Other shareholders trade at the average market rate.

The statistics suggest that there is little point in discussing combined institutional portfolio activity as the sector turnover policies are so very different. Further analysis of the turnover rates presented in Table IV is given in Table V which shows the contribution of purchasing and selling activity to portfolio turnover. The measure chosen to represent portfolio volatility is equity sales expressed as a percentage of average market value of equity holdings, the figure in brackets being portfolio turnover rate less portfolio volatility rate, i.e., equity purchases as a percentage of the market value of average equity holdings.

Portfolio volatility statistics reveal that insurance company sales and purchases activity rates are lower than the market averages, the purchases rate being higher than the sales rate due to their surplus inflow of funds. Pension fund turnover policies are now more clear. In all periods sales rates are below and purchases rates above market averages, the one exception being the public pension fund purchases activity rate in 1968. Investment trust portfolio activity tends towards the market average both as regards acquisitions and disposals. The portfolio sales and purchases activity rates of unit trusts are well above average market rates in all periods. Continuous net disposals by other shareholders are reflected in their portfolio activity rates. Sales are slightly above average, purchases slightly below. The corollary is that purchases activity rates of combined institutions are rather more and sales activity rates

TABLE II
Institutional Holdings of UK and Overseas Sterling Equities Quoted on the London Stock Exchange at 31st March (£m)

	1967	%	1968	%	1969	%	1970	%	1971	%	1972	%	
Insurance Companies	2,773	(11.0)	4,047	(11.4)	5,189	(12.0)	4,783	(12.7)	4,984	(13.6)	9,075	(15.8)	
Private Pension Funds	1,541	(6.2)	2,273	(6.3)	2,736	(6.3)	2,421	(6.4)	2,497	(6.8)	3,931	(6.8)	
Public Pension Funds	443	(1.8)	707	(2.0)	867	(2.0)	848	(2.3)	981	(2.6)	1,715	(3.0)	
Local Authority Pension Funds	225	(0.9)	352	(1.0)	474	(1.1)	447	(1.2)	499	(1.4)	849	(1.5)	
Investment Trust Companies	1,829	(7.3)	2,703	(7.6)	3,201	(7.4)	2,840	(7.5)	2,796	(7.6)	4,305	(7.5)	
Unit Trusts	514	(2.1)	837	(2.3)	1,185	(2.7)	1,162	(3.0)	1,143	(3.1)	1,902	(3.3)	
Other Shareholders	17,730	(70.7)	24,724	(69.4)	29,614	(68.4)	25,302	(66.9)	24,031	(65.0)	35,716	(62.1)	
Total Market Value	25,055		(100)	35,643	(100)	43,266	(100)	37,793	(100)	36,936	(100)	57,493	(100)
Combined Pension Funds	2,209	(8.9)	3,332	(9.4)	4,077	(9.4)	3,716	(9.8)	3,977	(10.8)	6,496	(11.3)	
Combined Institutions	7,325	(29.3)	10,919	(30.6)	13,652	(31.6)	12,501	(33.1)	12,905	(35.0)	21,777	(37.9)	

TABLE III
Distribution of Total Equity Turnover on the London Stock Exchange (£m)

	1966	%	1967	%	1968	%	1969	%	1970	%	1971	%	1972	%
Insurance Companies	338	(9.6)	627	(9.1)	964	(10.6)	891	(10.2)	966	(11.0)	1,330	(9.9)	1,955	(9.8)
Private Pension Funds	263	(7.4)	416	(7.2)	630	(6.9)	597	(6.9)	669	(7.6)	1,021	(7.6)	1,675	(8.4)
Public Pension Funds	53	(1.6)	74	(1.3)	110	(1.2)	181	(2.1)	213	(2.4)	305	(2.3)	548	(2.7)
Local Authority Pension Funds	56	(1.6)	71	(1.2)	131	(1.4)	144	(1.6)	147	(1.7)	234	(1.7)	296	(1.6)
Investment Trust Companies	631	(14.9)	884	(16.2)	1,251	(13.7)	1,276	(14.6)	1,104	(12.5)	1,437	(10.7)	2,598	(12.9)
Unit Trusts	187	(5.3)	316	(5.4)	717	(7.9)	832	(9.6)	891	(10.1)	1,093	(8.2)	1,447	(7.2)
Other Investors	2,137	(59.9)	3,616	(60.6)	5,315	(58.3)	4,792	(55.0)	4,822	(54.7)	7,957	(59.6)	11,547	(57.5)
Total Equity Turnover	<u>3,566</u>	<u>(100)</u>	<u>5,804</u>	<u>(100)</u>	<u>9,118</u>	<u>(100)</u>	<u>8,713</u>	<u>(100)</u>	<u>8,812</u>	<u>(100)</u>	<u>13,377</u>	<u>(100)</u>	<u>20,068</u>	<u>(100)</u>
Combined Pension Funds	<u>372</u>	<u>(10.4)</u>	<u>561</u>	<u>(9.7)</u>	<u>871</u>	<u>(9.5)</u>	<u>922</u>	<u>(10.6)</u>	<u>1,029</u>	<u>(11.7)</u>	<u>1,560</u>	<u>(11.7)</u>	<u>2,519</u>	<u>(12.6)</u>
Combined Institutions	<u>1,429</u>	<u>(40.1)</u>	<u>2,288</u>	<u>(39.4)</u>	<u>3,803</u>	<u>(41.7)</u>	<u>3,921</u>	<u>(45.0)</u>	<u>3,990</u>	<u>(45.3)</u>	<u>5,419</u>	<u>(40.6)</u>	<u>8,518</u>	<u>(42.6)</u>



TABLE IV
Portfolio Turnover – Equity Purchases plus Sales as Percentage of Average Market Value of UK Equity Holdings at 31st December

	1967	1968	1969	1970	1971
Insurance Companies	16.3	19.4	15.5	18.1	20.2
Private Pension Funds	23.5	25.3	21.5	26.7	33.6
Public Pension Funds	14.5	14.7	21.0	24.4	25.2
Local Authority Pension Funds	28.5	33.8	31.2	33.9	38.2
Combined Pension Funds	22.1	24.0	22.8	27.0	32.2
Investment Trusts	25.8	26.8	23.3	24.2	27.6
Unit Trusts	62.1	74.3	68.2	72.7	73.5
Other Shareholders	19.7	23.0	19.3	21.6	31.6
Market Average	20.6	24.3	20.8	23.5	31.1

TABLE V
Portfolio Volatility – Equity Sales as Percentage of Average Market Value of UK Equity Holdings at 31st December

	1967	1968	1969	1970	1971
Insurance Companies	6.2	(9.1)*	7.4	(12.0)	6.5
Private Pension Funds	8.3	(15.2)	9.3	(16.0)	9.3
Public Pension Funds	3.7	(10.8)	3.9	(10.8)	5.7
Local Authority Pension Funds	6.4	(22.1)	10.1	(23.7)	10.0
Combined Pension Funds	7.2	(14.9)	8.2	(15.8)	8.6
Investment Trusts	10.1	(15.7)	11.5	(15.3)	12.1
Unit Trusts	18.6	(33.5)	26.7	(47.6)	28.2
Other Shareholders	11.2	(8.5)	13.1	(9.9)	10.5
Market Average	10.3	(10.3)	12.1	(12.2)	10.4

*Figures in brackets are Table IV less Table V statistics, i.e. Equity Purchases as Percentage of Average Market Value of UK Equity Holdings at 31st December.

rather less than market averages.

Having presented statistics relating to the equity ownership, trading and portfolio activity of institutional shareholders, the remainder of this paper assesses the implications of the institutional presence in the market and examines the roles traditionally attributed to the large investing institutions.

Participation in Management

A press announcement issued by the Bank of England on 16th April 1973 stated that the representative bodies of the four major groups of institutional shareholders - the British Insurance Association, the National Association of Pension Funds, the Association of Investment Trust Companies, and the Association of Unit Trust Managers - had formed a new Institutional Shareholders' Committee. The aim of the committee is to stimulate action to improve efficiency in industrial and commercial companies. This is an important development as it formally acknowledges, with the full support of the Governor of the Bank of England, the willingness of institutional investors to participate actively in managerial decision-making.

Traditionally, institutions are investors, not managers. If a company's performance is poor, the shares are sold, institutional investment protection committees overtly acting only when shareholders' rights are endangered, examples of this kind of action being City of London Real Property Co. Ltd. 1963, British Shoe Corporation 1964, and the Crown Cork Case 1964. The investment protection committees of the BIA, NAPC and AUTM have, however, operated behind the scenes. The impetus now given to institutions to participate actively in management may be felt most strongly in large companies where they concentrate their increasing equity holdings. Reactions by the press, public and politicians to institutional participation in decisions affecting redundancy, industrial conflict and regional development have yet to appear.

Resource Allocation

Apart from their ability to influence company decisions through their investment protection committees and as major shareholders in most large companies, institutional shareholders participate in the resource allocation process by which the savings of individuals are channelled into investment, and play an important part in merger and takeover situations. In recent years, institutional strength has been apparent in cases involving GEC-AEI, Capitarium-Duple Motor Bodies, and American Tobacco-Gallaher. The new Institutional Share-

holders' Committee may find itself playing a similar role to the defunct Industrial Reorganisation Corporation, actively promoting industrial rationalisation.

The ability to channel vast quantities of the nation's resources into particular areas of investment carries a responsibility to allocate those resources to efficient users. A study of the effectiveness of institutional investment, particularly mutual funds, in the USA, led Irwin Friend and his associates to the conclusion that 'mutual funds as a whole, according to our results, are neither especially good nor especially bad at directing capital into profitable areas of investment'³ and 'mutual funds showed neither superior nor inferior ability to direct capital into those areas of economic investment which subsequently turned out to be the most profitable'⁴. Much more research is needed into the UK institutional resource allocation mechanism before firm conclusions can be drawn as to its efficiency.

Protection of Small Shareholders

The suggestion that insurance companies should form a watchdog committee on public companies was put forward by Keynes.⁵ In recent years, exhortations to institutions to protect the interest of small shareholders have proliferated, the Institutional Shareholders' Committee being formally announced in 1973. However, the method by which individuals apparently benefit from protection afforded by institutions is the 'invisible hand'. Institutions have preferred to avoid publicity in the past when dealing with company management, and the statement issued by the Bank of England expressly states that action by the Institutional Shareholders' Committee will not be advertised. Institutional involvement with industry necessarily entails the receipt of preferential investment information within the meaning of 'inside information' to be dealt with in the proposed reforms. The Gallaher affair in the UK and the behaviour of forewarned institutional investors of Penn Central in the USA suggest that the promotion of the welfare of small shareholders is not a prime objective of the equity policies of financial institutions.

Expression of concern for the private investor by the financial press, members of the Stock Exchange, the Wider Share Ownership Council, and politicians has

³Friend, Irwin; Blume, Marshall; and Crocket, Jean, *Mutual Funds and Other Institutional Investors: A New Perspective*, McGraw-Hill, 1970, p. 72.

⁴Ibid., p. 94.

⁵Keynes, John Maynard, 'Principles of Investment Policy' (address to) National Mutual Life Assurance Society, London, 25.1.28, cited by Rubner, Alex., *The Ensnared Shareholder*, Penguin Books, 1966, p. 151.

not resulted in an increased personal sector presence in the stock market.

The market share of all UK equities owned by individuals is consistently and rapidly diminishing. Table I shows that the percentage of all UK equities owned by investors other than the four largest groups of institutional shareholder has fallen from 69.5 per cent in 1966 to 61.0 per cent in 1971. Included in 'other shareholders' is the private individual. In a survey carried out for the Wider Share Ownership Council, Frank Broadway found, in a sample of 48 large companies, that equity holdings by individuals had dropped from 32.6 per cent to 22.4 per cent during the period 1965-1969, while John Moyle⁶ has demonstrated that the percentage of all UK equities owned by the personal sector has fallen from 65.8 per cent in 1957 to 54.0 per cent in 1963 and 47.4 per cent in 1969.

Portfolio Management

Assessment of the investment performance of institutional portfolio management is made difficult by both the lack of information and difficulty of establishing a universal performance criterion. Only in the case of unit trusts has much detailed research been possible. A major study of mutual funds by the Wharton School of Finance and Commerce reported by Brown and Vickers⁷ concluded that the funds on average performed no better and no worse than the composite markets from which they selected their securities; that the shifting of portfolio structures and high levels of portfolio activity were not associated with different levels of performance; and that the funds were not successful to any statistically significant extent in channelling investments into securities that subsequently experienced a favourable trend in earnings per share.

Friend, Blume and Crockett updated the 1962 study, their findings being less conclusive. For the period 1960-1968 they found that funds have not generally matched the performance of equally distributed random investments in the New York Stock Exchange, but have fully matched the performance of proportionally distributed random investments in NYSE stock, and high risk funds have surpassed such random performance, especially

ACCOUNTING AND BUSINESS RESEARCH

during the period 1964-1968. There is a need for intensive research into the equity policies and performance of insurance companies, pension funds, and investment trusts before any meaningful comments can be made on the quality of their portfolio management.

Market Stability

The observation is often made that institutional shareholders stabilise the stock market, an increasing institutional presence thereby ensuring an increasing stability. 'It is generally agreed that the growing institutional investors are contributing to stability in the stock market'. Statements to this effect are rarely followed by a definition of stability or a list of the economic or social benefits derived from the desired stability.

Baumol⁸ has examined the ability of the jobber, the traditional market stabiliser, to maintain share prices in equilibrium, and concludes that the classical equilibrium pricing mechanism, by which the value of a share would equal its discounted future stream of benefits, is not achieved in the stock market. Jobbers, he decides, contribute to short-term stability by providing a market but do not have the knowledge, nor should they be expected to have the knowledge, to reduce the magnitude of long-term trends. Applying Baumol's view to institutional shareholders, it is apparent that institutions cannot be expected to maintain prices in equilibrium.

The study by Friend, Blume and Crockett associates stability with the ability of the stock market to maintain equivalent rates of return on comparable investments, and as there appears to be no increase in market efficiency from the period 1958-1960 to 1967-1968, despite the increased equity activity of institutions, concludes that mutual funds have little or no influence in stabilising prices except possibly in the very short run.

The random-walk hypothesis defines an efficient market as one in which a share price reflects all available knowledge, any new information being immediately incorporated into the price. Prices are not necessarily those necessary to achieve an optimal allocation of resources, but they are intrinsic values subject to the constraint imposed by inadequate knowledge. The Cootner¹⁰ model suggests that when

⁶Moyle, John, *The Pattern of Ordinary Share Ownership 1957-1970*, Cambridge University Press, 1971, p. 18.

⁷A Study of Mutual Funds, prepared for the SEC by the Wharton School of Finance and Commerce, Report of the Committee on Inter-State and Foreign Commerce, Washington: USA, Government Printing Office, 1962, reported by Brown, F. E., and Vickers, Douglas. 'Mutual Fund Portfolio Activity, Performance, and Market Impact', *Journal of Finance*, May 1963.

⁸Murray, Roger F., 'Changing Share Ownership and Effect on the Market', *Commercial and Financial Chronicle*, Vol. 191, No. 5940, 7.4.60.

⁹Baumol, William J., *The Stock Market and Economic Efficiency*, Fordham University Press, 1969.

¹⁰Cootner, Paul H., 'Stock Prices: Random vs. Systematic Changes', *Industrial Management Review*, Vol. 3, No. 2, Spring 1962.

share prices move away from intrinsic values to an extent which allows profits to be made, professional investors operate in such a way as to push the price towards equilibrium. If Cootner's professionals exist, and are the portfolio managers of financial institutions, then above-average performance would be observed by those examining institutional investment. This does not appear to be the case.

Institutions may impair the efficiency of the market by their low activity rates, by their ability to operate outside the stock exchanges, by the creation of thin markets in the shares of companies in which their buy-and-hold policies are observed, and may have a permanent bullish effect on share

prices through their persistent buying. These areas are awaiting further research, as is the ability of institutional shareholders to stabilise the market in the sense most commonly attributed to them. Do institutions identify and help to iron out the peaks and troughs in the all-share index? Research data is currently being analysed and the results will be available shortly. Several people are currently researching in different academic institutions into the behaviour of institutional shareholders. Their results, and forthcoming developments in areas involving institutional shareholders, should prove interesting.

Investment Criteria for EDP Systems

A. D. Chambers

Return on Capital v Cash Flow

Over the past eight years the priorities of top management have changed. Cash is in short supply and expensive. It is no longer good enough to show that a proposed computer system has a positive return on capital employed (that is, it results in net savings): as cash as well as specialist expertise is in short supply, a computer system should be implemented only if it shows up well in terms of return on capital employed when compared with other possible systems developments, and indeed with *all* other competing investment opportunities of the organisation. It is true that sometimes there may be an 'overriding consideration' which compels the implementation of a computer system irrespective of the likely return but invariably these 'overriding considerations' seem less compelling when the true cost of the development is determined. Then of course there are problems in evaluating the intangible benefits and in allowing for risk and uncertainty with respect to future events.

Even assuming a proposed computer development shapes up well compared with other investment possibilities in terms of *return on capital* it may come unstuck in terms of *cash flow*. Cash flow matters as never before: today it is the main preoccupation of most boardrooms. Discounted cash flow techniques have for some time been used to reflect the timing of the cash flows both inwards and outwards on the basis that, even apart from inflation, tomorrow's cash is not as valuable to an organisation as today's

cash. With regard to cash flow, acquisitions of computer equipment fare no better nor worse than, for instance, the purchase of production equipment, for with good project management techniques the new equipment can be productive soon after it is delivered. Not so with *computer systems* development work. Estimates of the man years required to develop a new system are often so wildly optimistic that it is usually reasonable to double them to arrive at realistic estimates. Many systems would never have been implemented if realistic time estimates had been a basis of the cost-benefit analysis.

The Inflation Effect

The cash flow problem of computer systems is simply that months, often years, of development costs are incurred before the benefits start to accrue. 'Hyper inflation' may make this a 'hyper problem' as the annual incremental cash flows (i.e. the net cash inflow or outflow per annum), which are only favourable in the later years, must be discounted back to present values using a much higher discount rate than would be used in a non-inflationary situation.

However, at a time when inflation is running at an annual rate of about 25% it is encouraging to note that so long as *future costs and benefits will both increase at a rate equal to the general inflation rate* then a higher rate of general inflation has no harmful effect upon the net present value of a proposed project. This is illustrated for a sample computer system in

TABLE A
(Income) and expenditure from a sample computer system ignoring inflation and discounted cash flow

	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
System development costs	35,000	5,000	20,000	10,000	—	—	—
Annual savings	(50,000)	—	(10,000)	(10,000)	(10,000)	(10,000)	(10,000)
Cumulative return on capital	(15,000)	5,000	15,000	15,000	5,000	(5,000)	(15,000)

TABLE B

Present value of (income) and expenditure from a sample computer system assuming zero inflation and reasonable rate of return on capital of 10% (i.e. discount factor of 10% = 0.909091)

	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Present value of system development costs	31,446	5,000	18,182	8,264	—	—	—
Present value of annual savings	(37,909)	—	(9,091)	(8,264)	(7,513)	(6,830)	(6,209)
Cumulative return on capital	(6,461)	5,000	14,091	14,091	6,578	(252)	(6,461)

Tables A, B and C. Table A shows the system development costs and savings at year 1 values, by the year in which they occur. (In each table it is assumed that costs and income accrue on the first day of each year.) Table B assumes a zero rate of inflation and merely discounts future cash flows back to present values assuming that a reasonable rate of return on capital employed by an organisation is 10% in a zero inflation situation. It will be seen that over the six year life of the project, discounted cash flow techniques show a much reduced cumulative return on capital (£6,461 Table B, against £15,000 Table A) and so far we have completely ignored inflation, concentrating exclusively on the principle that an organisation is entitled to a reasonable return on capital in view of the risks it takes and the opportunities that exist for alternative investments of capital elsewhere (however rosy-eyed this principle may appear today!).

So Table B shows a positive return of £6,461 over

and above what this organisation considers a reasonable return. The organisation might go ahead with this investment subject to having the cash and so long as there were no alternative investments with a better rate of return. Table C allows for inflation at the current 25% p.a., and *assumes that the costs of developing the system as well as the future savings will all be increased by this rate of inflation*. The discount rate is now the sum of the *inflation rate* and, as before, the *reasonable rate of return*. However, since inflation is assumed to be 25% the organisation will need a 12.5% return on capital to earn the equivalent of 10% in a 'zero inflation' situation. Using a discount factor of 37.5% (25 + 12.5) it will be seen from Table C that the discounted cumulative return on capital is identical in an inflationary situation (Table C) as in a 'zero inflation' situation (Table B), or for that matter as it would be in a deflationary situation.

So if future anticipated costs and savings increase

TABLE C

Present value of (income) and expenditure from a sample computer system assuming 25% inflation and a reasonable rate of return on capital of 12.5%*
(i.e. discount factor of 37.5% = 0.727273)

	Total	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
A. System development costs adjusted for inflation (25%)	45,625	5,000	26,000	15,625	—	—	—
B. Annual savings adjusted for inflation (25%)	(102,588)	—	(12,500)	(15,625)	(19,531)	(24,414)	(30,518)
Present value of system development costs (1)	31,446	5,000	18,182	8,264	—	—	—
Present value of annual savings (2)	(37,909)	—	(9,091)	(8,264)	(7,513)	(6,830)	(6,209)
*12.5% = 10% + rate of inflation (25%)		(1)	Line A × discount factor per annum				
		(2)	Line B × discount factor per annum				

A Capital Cost or a Revenue Expense?

in exact proportion to changes in the purchasing power of the pound, then these future changes in costs and savings can have no real bearing on the viability of the capital expenditure proposal. A corollary of this is that it is only valid to justify a proposed computer system by claiming that the cost of running the existing manual system is always increasing if *in fact the rate of increase of the costs of the manual system is greater than the inflation rate*. It is admitted that this will frequently be the case as clerical staff costs are accelerating faster than inflation whereas computers have so far always become cheaper (per unit of processing power) with the passage of time. If future savings will not increase by as much as the inflation rate (e.g. if they are fixed by the terms of a contract) then an increasing rate of inflation may destroy a notional positive net present value.

Raising Capital

Discounted cash flow techniques allow us to reflect the fact that future inflows are not so valuable as current inflows and we have seen that computer projects tend to suffer as there may be no inflow at all in the early years. However, from a corporate point of view we may still have problems in gaining consent to investment in computer systems even when we have shown a net positive cash inflow (such as in Table C) and even if this inflow is greater than that which could be earned from any other investment proposal being considered by the organisation. Leaving aside the question of assessing the degree of risk and uncertainty associated with the cash flows of the proposed computer project, it may simply be the case that there is a shortage of cash and none is available for investment. The shortage may be absolute in that the organisation has no means of raising cash (perhaps because the banks are not lending), or it may be relative. A relative shortage (i.e. relative to the organisation's own assessment of its own situation) exists if the organisation cannot raise the sort of capital it wants. Borrowing cash over a fixed term at fixed interest rates is less satisfactory and more hazardous than issuing shares which are irredeemable and have no commitment to dividends. There is a limit to how highly geared a prudent company will allow itself to become by taking out fixed term commitments at fixed interest rates. This will never be more true than in a time of high interest rates. Many companies today would willingly offer new issues of ordinary shares but they know the market would not take them up at the moment. So there may be good reasons for turning down computer investment proposals even if they compare favourably with other alternative investment proposals.

In many organisations the appraisal of computer systems developments is not subject to the capital investment appraisal procedures of the organisations. It is fundamentally unsound that computer systems should be outside such safeguards, as the expenditure is by nature a capital investment with a return over a period of years – even if for accounting purposes the expenditure on computer systems is written off in the year in which it is incurred rather than capitalised and written off over the useful life of the system. Even if the organisation does not impose upon the systems department its standard capital appraisal procedures, the systems department itself should subject all major systems development proposals to proper capital investment appraisal.

It is acceptable if unusual accounting practice to capitalise the cost of developing a computer system and then to write this off over a period of years rather than charging the entire development costs against the year or years in which they were incurred. The accounting principle here is that of matching costs with revenue so far as is practical. Currently there is disenchantment with the practice of capitalising research and development costs and in part this is due to the nebulous nature of this work and the difficulty of linking the costs with future income or savings. The problem is not so acute with computer systems where the 'end product' can be forecast more accurately. Capitalising a computer project is certainly appropriate if the organisation commits an exceptional amount of its resources to the enterprise such as in the design of a real time airline reservation system or an integrated management information and operating system. Where the expenditure is not exceptional it will be clear that the practice of writing off systems development costs in the year in which they are incurred will result in approximately the same annual charge as will capitalising all systems development costs and writing them off over a period of years. For example if an organisation had developed one computer system in each of the past five years each of which cost £100,000 to develop, the charge against profits would have been the same had the systems been written off in the years in which they were developed (£100,000 p.a.) rather than capitalised and each is written off over five years ($5 \text{ systems} \times £100,000 \text{ cost}$)

5 years

An added reason for not capitalising routine computer systems development is that it is rare indeed for a system to be developed within one year so, even on the basis of writing off development

costs when they are incurred, the expenditure will usually be spread over more than one year.

Replacement Cost Accounting

If systems development costs are capitalised and written off over a period of years, a prudent accountant will in addition recommend an annual transfer from profits to a reserve (in addition to historical cost depreciation) in order to set aside adequate funds to replace systems when the time comes. If the write-off period is five years, the capitalised computer systems should be revalued annually and 20% of the total new valuation should be written off against the year's income. This 20% provision provides adequate funds for the development of similar sized replacement computer systems, and the inflation element has been taken care of since the provision is 20% of the *replacement value* rather than the historical cost. The mechanics are illustrated in Table D and it will be noted that the backlog effect has been ignored. With costs increasing at 25% per annum the total provision over five years of £2,052 is much less than the replacement cost of the system after five years (£3,050). This is because the annual write-off has been taken as simply 20% of the replacement value of the system at that time with no attempt to write off the lost backlog due to the revaluation.

£3,050 which is exactly enough to fund the replacement of one similar sized system in year 5. In this way, on a cyclical basis, there will be adequate funds to replace each system every fifth year.

Capitalising computer systems developments, and writing them off on a replacement cost basis, ensures not only that development costs are fairly apportioned over the years which will benefit from the investment, but also that the company reserves enough to replace the system in due course. Against this practice it can be argued that, even if the system has to be replaced ultimately, it is unlikely to be replaced by a similar system and therefore an adequate provision to develop a replacement system of a similar nature is inappropriate. This argument, which has also been used to discourage replacement cost accounting for other fixed assets such as plant and equipment, is weak as, taken overall, a company operating a system of replacement cost accounting is likely to be in a better position to replace its investments as they wear out than a company working to historical cost depreciation rules. Furthermore, it is clearly unreasonable that the operations of for instance Year 5 (Table D) should be charged with the same write-off (£250) as Year 1 when £250 in Year 5 is worth only .38 of what it was worth in Year 1 (assuming inflation at 25%). The danger of not following replacement cost accounting principles is that an organisation may find itself short of resources to provide for the replacement of computer systems when their replacement becomes due, and may therefore be unable to continue at all or at least at the same level of operations: this implies that such an organisation has taken as 'profits' in earlier years what in reality was part of the 'capital' of the company.

TABLE D
Replacement accounting for a computer system

Year	Cost	Replacement Value (1)	Annual Write-off (2)
0	1,000	1,000	—
1		1,250	250
2		1,563	313
3		1,953	391
4		2,441	488
5		3,050	610
Total provision over 5 years			2,052

(1) Assuming inflation of 25% p.a.

(2) This provision for replacement is 20% p.a. and assumes a useful life of 5 years for the computer system.

Fortunately this backlog effect is unimportant in a going concern. This can be illustrated simply. Let us assume an organisation is writing off five computer systems each of similar size to the one in Table D. In year 5 the total provision would be £610 × 5 =

The Life of a System

With almost any investment in 'fixed assets' it is difficult to determine the length of the period over which the asset should be written off, and it is best to classify assets into homogeneous groups for this purpose and to accept that the write-off period is an approximation only. *Five years is a reasonable rule of thumb for most computer systems* despite our optimism that our systems will last for ever. They rarely do. Statutory changes, changes in corporate structure (takeovers, etc.), unforeseen changes in business requirements (such as the transfer of clock card staff to a salaried basis) and finally hardware developments (not to mention software progress) all mean that our computer systems will probably be substantially amended or be completely superseded within five years. Using discounted cash flow techniques it is true that cash flows far into the future

P1939

TABLE E
Computer usage by application area in an average organisation today

	<i>Typical Expenditure (%)</i>	<i>Impact of 10% saving (%)</i>	<i>Computer applications today</i>
Production and distribution	65	58.5	10
Administration	15	13.5	90
Other and exceptional expenses, tax and profit	20	28.0	
Total income	100	100.0	

become discounted down to a present value which may be so small as to be immaterial and so the problem will sometimes be more apparent than real. However, beware of any cost-benefit analysis which assumes a system life of more than about five years!

Optimum Systems Investments

It has already been shown that there are usually many investment alternatives competing for a limited supply of resources. As far as computer systems are concerned this means that, overriding considerations apart, investment should be made in those systems which show the greatest return on capital. Table E shows that this commendable practice has not been followed. In a typical manufacturing concern, 65% of hard earned sales revenue is expended on production and distribution whereas only 15% goes on routine administration. It is recognised that there is a grey area where it is difficult to classify an activity between these two categories, but nevertheless the broad distinction is useful and the relative expenditure in each area is illuminating. If the computer were able to make an equal impact upon each of these two areas the effect on profits would be much greater if the computer were applied to production and distribution problems. A 10% saving of production and distribution costs would increase profit, etc. by 32.5% while a 10% savings of administrative costs would increase profits, etc. by only 7.5%.

Routine Administrative Systems

It is perhaps strange that 90% of computer applications today are routine batch processing administrative tasks which do what clerks used to do. The potential for savings in this area is so low and it is common experience for these applications to cost more on the computer than they previously cost to do manually. In addition these applications introduce a factory type atmosphere into clerical procedures:

noise (e.g. of data preparation machines), deadlines and batch control are all soul destroying. Once 'hooked' on the computer for these administrative tasks an organisation loses the flexibility it once enjoyed under the old manual systems, and in view of the extremely high volumes of input and output associated with most of these applications the organisation would be very hard pressed to operate a back up system if the computer broke down. Too few organisations have seriously addressed themselves to the problem 'How would we cope if our computer could not be used for several weeks?' It must be clear now that industrial or civil unrest might lead to extended periods of down time. Undoubtedly many companies would crash and never recover if this happened to them.

Routine administrative tasks are both *high volume* and *repetitive*. The computer programs are relatively straightforward to write and, when in use, most logical routines of each program are accessed again and again. In other words the 'usage factor' of the program coding is commendably high. But because these tasks are high in input-output volumes they make inefficient use of the central processor (CPU) as the computer is usually input-output bound, held up by the mechanical speed limitations of certain peripheral device such as the card reader or the line printer. Consequently much attention has been paid to the problems of speeding up data capture (by introducing new methods and double-banking peripheral devices) and utilising CPU time more efficiently. On the basis that everyone's output is someone else's input the exchange of magnetic tapes or computers conversing with computers may avoid most of the problems of data capture. Even so many commercial computers are still input-output bound. Twelve years ago, when routine administrative tasks accounted for virtually all computer systems, the problem was even greater as hardware was relatively more expensive (70% of data processing

costs) and systems were fairly cheaply designed (30% of data processing costs). Today the relative costs have approximately reversed with systems design and overheads accounting for almost 70% of data processing costs. With systems design becoming relatively more expensive, batch processing systems with their high 'usage factor' are more cost effective than they were, and it does not matter so much that computers are inefficiently used as the hardware is now relatively cheap. But the potential for cost savings in this area is limited as routine administrative tasks cost an organisation much less than the production and distribution functions cost.

Routine administrative tasks were computerised first due mainly to their relative simplicity and the fact that many of them were already automated on accounting machines and tabulating equipment, and accountants were easier to win over than production and distribution managers. Indeed most computers were set up initially within the finance functions of organisations.

It is largely fortuitous that the computerisation of these tasks has given us the basic computer files (e.g. payroll, stocks, orders, etc.) which, taken together, can be made into the database which is needed for most of the potentially more profitable systems. This in itself has a bearing on determining whether or not to proceed with proposed computer systems investments. Systems proposals are inter-related. It is this inter-relatedness of computer investments which makes it very difficult to conduct meaningful cost-benefit analyses. It may be that a routine administrative computer system is justifiably a deliberate 'loss leader' which, due to the master files it creates, makes it possible to design subsequently an advanced production system which might pay off handsomely.

Middle Management Systems

Production and distribution computer systems are usually the first opportunities an organisation has to use the computer as a decision making tool. There is a major step of confidence to be taken before an organisation accepts computer based production or transport scheduling, process control, linear programming, PERT and so on. Compared with batch processing tasks these systems are relatively complicated to program and the program logic usually has a lower usage factor than is the case in most administrative batch processing tasks. Consequently these systems are expensive to develop but once developed they can often be slotted into a partitioned computer with little increase in overall computer run times as they tend to be *low* in input-output volumes

and *high* in CPU time. In view of their complexity and expense these are systems where ready made packages will often be appropriate.

The inter-relatedness of computer projects is illustrated further by considering the problem of assessing the cost of computer time to be charged against a particular computer system. The proposed project may take virtually no computer time if it overlaps almost 100% with one or more peripheral bound jobs. In this case the real cost to the organisation of running this system is hardly anything at all. But subsequently additional new systems or upgraded hardware (the latter may have been needed in part because of our example system) may alter things so that our example system takes time which could be 'sold' for other uses. If the system was justified initially on the basis that it used costless free computer time that justification would now no longer apply.

There are risks associated with charging out computer costs in proportion to CPU time used. Unless the computer is fully utilised each in-hour system may bear an unreasonable charge and user departments may find it cheaper to buy their own computer or mini-computer or to go out to a bureau. As the in-house installation loses more and more users so the cost to those who remain gets higher and higher.

Cost-benefit analyses should be undertaken at the feasibility study stage for every computer system. It is unfortunate that quite a lot of systems design has to be done at the feasibility study stage before authorisation to proceed can be given; in order to put a price to certain costs and benefits - in particular the cost of computer time. The further one moves away from routine administrative tasks towards middle management decision making tasks, particularly in the area of production and distribution, the more difficult it becomes to price out the anticipated costs and benefits. Most costs and benefits of administrative systems are *tangible*, that is measurable in terms of cash. When the computer is used in a decision making role many of the costs and benefits are *intangible*, that is impossible or impractical to quantify. Intangible costs and benefits are no less real for being impossible to measure. Many organisations shy away from using their computers for applications where the benefits are intangible and consequently refrain from applying their computer to middle management tasks in production and distribution or to top management tasks in, for instance, corporate planning. If the computer is used as an aid to working out the product selling plan for the next twelve months it is virtually impossible to decide even in retrospect let

alone at the feasibility study stage how much the computer has contributed to the sales achievement: this could only be done if it were possible to determine what would have happened if the computer had not been used. Similarly the cost savings attributable to the computer as a result of computerised production scheduling are often impossible to quantify. It is not a good enough reason to steer clear of such areas of application just because they have a high proportion of intangible benefits and cannot be shown to be cost effective on the basis of their tangible costs and benefits. It has been shown that the potential is by far the greatest in these areas.

Computers for Top Management

The potential for savings is greatest of all in the area of top management tasks such as corporate modelling and profit planning: in these areas the computer is dealing with all the resources of the company. The tangible development costs are however quite high and the program logic usage factor is very low indeed.

It follows of course that where there is a potential for large, if intangible benefits, there is an equal potential for disastrous catastrophes. Great care must be taken to ensure that any decision making which is dedicated to the computer is truly 'programmable'. Wherever possible the computer should advise a course of action but the final decision should be with management. Management can be freed to concentrate on what is not 'programmable' with a consequent opportunity to improve the quality of their control.

Assessing EDP Profitability

One rarely sees a really honest, objective cost-benefit analysis at the feasibility study stage and even less frequently is a system reviewed for its cost effectiveness after it is fully operational. Most data processing departments are not in the happy position to let their organisation know how much overall their department is saving or costing the organisation. It is a good idea to keep a schedule of cost savings of systems and update it annually for changes which alter the cost savings of each system. In this way the data processing department can keep a running total of the overall return on capital to the organisation from its total computer investment. It is reasonable

to carry forward *ad infinitum* a cost saving to subsequent years. For instance, if computerisation of sales accounting led to a reduction in the average credit period with a consequent saving in bank overdraft charges, it is reasonable to regard this as a data processing department annual saving of *subsequent years*, and if the size of the organisation's operations doubles it is then reasonable to claim a D.P. saving for the organisation of double the original saving. It is said that over 70% of organisations are dissatisfied with their computer investment and the reason may be that nobody has bothered to measure it properly.

It is difficult to forecast in advance the level of efficiency that a proposed system will attain, and there are occasions when short cuts may be justified. For instance an organisation may be considering a tailor-made payroll system to replace the manual system which currently costs, say, 20p to produce a payslip. It can be useful to visit similar concerns who computerised their payrolls some years earlier: their current computer cost per payslip may give a better guide to what can be achieved than the most tedious and detailed run time estimates and so on. Caution must however be exercised to ensure that like is being compared with like.

Conclusion

Computer systems should be appraised similarly to other capital projects. Of course, computer systems have special characteristics but the same can be said of any other category of capital investment. The difficulties of measuring costs and benefits should not deter from the task and it should always be borne in mind that it is the *real cost* to the organisation which is to be measured. On the whole *intangible* benefits are probably the larger benefits and it is regrettable that most organisations assess computerisation opportunities almost exclusively on their *tangible* costs and benefits, or alternatively on alleged 'overriding considerations' which make computerisation imperative whatever the cost. Finally it is worth emphasising that *implementation costs* are a substantial part of total costs but are often forgotten altogether when the feasibility study is undertaken. At the extreme, implementation may be impossible. Never underestimate the size of the task of master file creation and the switch over to computer operation.

Relative Company Risk Over Time

Haim Falk and James A. Heintz

Financial ratios have been used by many researchers in recent years in examining the risk characteristics of companies and industries. For example, Beaver,¹ Altman² and Meyers and Pifer³ have used company ratios to predict company financial difficulties. Horrigan⁴ has related company ratios to bond ratings. Melnyk and Mathur⁵ and Deakin⁶ have attempted to classify companies into similar risk groups according to their ratios. Analysis of the industry element of company risk has been less common, but this area is receiving increasing attention. In both the market risk models developed by Markowitz⁷ and Sharpe,⁸ and the work of Beaver, *et al.*,⁹ the industry element is ignored. However, Ball and Brown¹⁰ identified an industry effect on earnings by examining accounting earnings from firms categorised into industry groups. Gupta¹¹ also experienced some success in identifying patterns in industry ratios which were systematically related to industry characteristics. Lev¹² found some evidence that firms seek to adjust some financial

ratios toward their industry averages. Further, Horrigan¹³ and Edmister¹⁴ sought to isolate the industry factor in their work by dividing company ratios by industry averages.

In the research reported to date, there appears to have been no attempt to deal explicitly with both company and industry effects together in analysing corporate risk. In addition, little effort has been directed towards analysing the combined behaviour of meaningful sets of ratios over time.

The purposes of this paper are (1) to demonstrate the potential importance of consideration of the industry effect in studying corporate risk, and (2) to examine whether there is a pattern of corporate risk behaviour over time reflected in sets of financial ratios. The ratios selected for this study are intended to measure different aspects of a common characteristic, namely, risk of default or the probability of failure.¹⁵ Both company and industry sets of ratios

¹See Beaver, William H., 'Financial Ratios as Predictors of Failure', *Empirical Research in Accounting: Selected Studies* 1966, University of Chicago (1967), 71-111; 'Alternative Accounting Measures as Predictors of Failure', *The Accounting Review* (January 1968), 113-122; and 'Market Prices, Financial Ratios, and the Prediction of Failure', *Journal of Accounting Research* (Autumn 1968), 179-192.

²See Altman, Edward I., 'Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy', *Journal of Finance* (September 1968), 589-609.

³See Meyers, Paul A. and Howard W. Pifer, 'Prediction of Bank Failures', *Journal of Finance* (September 1970), 853-868.

⁴See Horrigan, James O., 'The Determination of Long-Term Credit Standing with Financial Ratios', *Empirical Research in Accounting: Selected Studies*, 1966, University of Chicago (1967), 44-62.

⁵See Melnyk, Z. Lew and Iqbal Mathur, 'Business Risk Homogeneity, a Multivariate Application and Evaluation', *Proceedings of the 1972 Mid-West AIDS Conference* (April 1972).

⁶See Deakin, Edward B., 'A Discriminant Analysis of Predictors of Business Failure', *Journal of Accounting Research* (Spring 1972), 167-179.

⁷See Markowitz, Harry, 'Portfolio Selection', *Journal of Finance* (March 1952), 77-91, and *Portfolio Selection: Efficient Diversification of Investments* (Wiley, 1959).

⁸See Sharpe, William F., 'A Simplified Model for Port-

folio Analysis', *Management Science* (January 1963), 277-293.

⁹See Beaver, William, Paul Kettler, and Myron Scholes, 'The Association Between Market Determined and Accounting Determined Risk Measures', *The Accounting Review* (October 1970), 654-682.

¹⁰See Ball, Ray and Philip Brown, 'An Empirical Evaluation of Accounting Income Numbers', *Journal of Accounting Research* (Autumn 1968), 158-178, and Brown, Philip and Ray Ball, 'Some Preliminary Findings on the Association Between the Earnings of a Firm, its Industry, and the Economy', *Empirical Research in Accounting: Selected Studies* 1967, University of Chicago (1968), 55-77.

¹¹Gupta, Manak C., 'The Effect of Size, Growth and Industry on the Financial Structure of Manufacturing Companies', *Journal of Finance* (June 1969), 517-529.

¹²Lev, Baruch, 'Industry Averages as Targets for Financial Ratios', *Journal of Accounting Research* (Autumn 1969), 290-299.

¹³See Horrigan, James O., 'The Determination of Long-Term Credit . . .'

¹⁴See Edmister, Robert O., 'An Empirical Test of Financial Ratio Analysis for Small Business Failure Prediction', *Journal of Financial and Quantitative Analysis* (March 1972), 1477-1493.

¹⁵See Beaver, William H., 'Financial Ratios . . .'; 'Alternative Accounting Measures . . .'; Beaver *et al.*, 'The Association Between Market Determined . . .'; and Altman, Edward I., 'Financial Ratios, Discriminant Analysis . . .'

are included in the analysis, and a composite risk measure has been developed. Unlike most other composite measures, the technique used here requires no weighting of the various ratios.¹⁶

In section one the sample of firms and the ratios used in the study are described. In the second section the application of the scalogram technique of analysis is explained. Section three illustrates the potential importance of the industry effect in risk analysis. The analysis of relative risk over time appears in section four, and the final section contains some concluding observations.

The Sample and the Ratios

The sample of companies included in this study resulted from the application of a series of selection rules. First, 41 industries were selected for analysis from Robert Morris Associates Annual Statement Studies on the basis of three criteria: (1) at least two consecutive years of data for the period ending December 1971 were available; (2) there were no major changes in the number of companies included in the Statement Studies during the two-year period;¹⁷ and (3) each industry included at least one company whose trading volume in the New York Stock Exchange exceeded 1,000,000 shares in at least two of four quarters from July 1971 through June 1972.¹⁸

From these 41 industries, companies were selected which, based on data available through June 30, 1972, (1) had a trading volume of at least 650,000 shares for the most recent eight quarters; (2) were comparable according to our analytical technique with at least two other companies; and (3) were in industries which were comparable with at least two other industries. This yielded 39 companies in 6 different industries as shown in Appendices A and B.¹⁹ These 39 companies are the sample on which this paper is based.

Five industry average ratios were identified to serve as a composite index of risk for each of the industries. Each of the ratios (or a variation thereof, or its inverse) has been used with some success by other researchers in studies dealing with company

¹⁶See below, p. 28.

¹⁷The electronic computing equipment industry is an exception to this criterion. Because of the dramatic growth and significant market interest in this industry, it was considered desirable to include it.

¹⁸This criterion was used in order to include industries which contained companies with broad market exposure.

¹⁹Responses from institutional investors in a related project suggest that these 39 companies are well known. This evidence corresponds with the indication of investor interest provided by our volume criterion.

ACCOUNTING AND BUSINESS RESEARCH

risk characteristics.²⁰ The ratios, prior research dealing with them, and some of the characteristics they are likely to reflect are as follows.

(1) Total assets to working capital (TA/WC). The usefulness of this ratio in predicting corporate failure has been examined by a number of authors, including Altman,²¹ Beaver,²² Blum²³ and Deakin.²⁴ It is intended here to reflect characteristics of liquidity and flexibility. A higher ratio is indicative of a less liquid position. In addition, it would suggest a lower degree of flexibility or adaptability to changing circumstances in that a larger proportion of the asset (and liability) structure would be long term.

(2) Fixed assets to total assets (FA/TA). This ratio was used most recently by Meyers and Pifer²⁵ in a study of bank failures. We view it as an indicator primarily of industry product type and flexibility. A high ratio would suggest a product with a relatively high unit cost and long production cycle. Further, given the specialised nature of fixed assets in any given industry, it is more difficult to adapt and to convert to alternative products or production methods from a heavier fixed asset base, and in the event of default, realisation on disposal is likely to be lower.

(3) Average total assets to sales (ATA/S). This ratio, which has received attention in the works of Altman,²⁶ Horrigan,²⁷ and O'Connor,²⁸ reflects production characteristics in the sense of the asset base necessary to generate a given sales volume. In general, a higher ratio would be indicative of a need for a heavier asset base per output and, therefore, a higher risk situation.

²⁰Technically there is no explicit evidence from prior research that these ratios will be useful in examining industry risk. However, it seems plausible that if a ratio or its components reflect industry characteristics and it performed well in a study of company risk, it has the potential to perform well in analysing industry risk also. Given the paucity of prior research on industry risk, *per se*, this at least seems to be a reasonable place to start.

²¹Altman, Edward I., 'Financial Ratios, Discriminant Analysis . . .'

²²Beaver, William H., 'Financial Ratios as Predictors . . .' and 'Alternative Accounting Measures . . .'

²³See Blum, Marc Paul, 'The Failing Company Doctrine', unpublished Ph.D. dissertation, Columbia University (1969).

²⁴Deakin, Edward B., 'A Discriminant Analysis . . .'

²⁵Meyers, Paul A. and Howard W. Pifer, 'Prediction of Bank Failures'.

²⁶Altman, Edward I., 'Financial Ratios . . .'

²⁷See Horrigan, James O., 'Some Empirical Bases of Financial Ratio Analysis', *The Accounting Review* (July 1965), 558-568; and 'The Determination of Long-Term Credit . . .'

²⁸See O'Connor, Melvin C., 'On the Usefulness of Financial Ratios to Investors in Common Stock', *The Accounting Review* (April 1973), 339-352.

(4) Total debt to equity (TD/EQ). This version of the traditional measures of leverage has been used in a variety of contexts by a number of researchers, including Breen and Lerner,²⁸ O'Connor,²⁹ and Tamari.³⁰ The measure clearly is intended to reflect financial structure. Less obviously, it might reflect industry characteristics such as asset composition and type of product or production, in that there should be a relationship between such factors and financial structure. In this sense, this ratio complements ratios (1) and (2) above.

(5) Average accounts receivable to sales (AAR/S). Elton and Gruber,³¹ Horrigan,³² and Tamari,³³ all have used this ratio (or derivations therefrom) as a risk measure. It is included here to reflect characteristics such as liquidity, credit terms extended, product unit value and product durability.³⁴

Based on the underlying theory and the work of the previous researchers noted above, each of the above five ratios is structured such that the higher the ratio, the higher the risk.³⁵ Industry data for the initial scaling of industries according to risk were drawn from Robert Morris Associates Annual Statement Studies for the then latest available period, 1972. A summary of the six industries and corresponding ratios appears in Appendix A. In order to facilitate analysis, and because very small differences would be of limited significance, the ratios have been rounded.

The composite index of risk for each of the 39 companies was based on an analysis of relative industry risk, as described in the preceding paragraphs, and four company ratios. These four ratios, some of the characteristics they are intended to reflect, and their uses in prior research are discussed

²⁸See Breen, William J. and Eugene M. Lerner, 'Corporate Financial Strategies and Market Measures of Risk and Return', *Journal of Finance* (May 1973), 339-351.

²⁹O'Connor, Melvin C., 'On the Usefulness of Financial Ratios . . .'

³⁰See Tamari, Meir, 'Financial Ratios as a Means of Forecasting Bankruptcy', *Management International Review* (1966), 15-21.

³¹See Elton, Edwin J. and Martin J. Gruber, 'Improved Forecasting Through the Design of Homogenous Groups', *Journal of Business* (October 1971), 432-450.

³²Horrigan, James O., 'Some Empirical Bases . . . and The Determination of Long-Term Credit . . .'

³³Tamari, Meir, 'Financial Ratios as a Means . . .'

³⁴Cf., Gupta, Manak C. and Ronald J. Huefner, 'A Cluster Analysis Study of Financial Ratios and Industry Characteristics', *Journal of Accounting Research* (Spring 1972), 77-95.

³⁵An expanded discussion of these ratios and their theoretical relationship to investment decision making can be found in the authors' 'Assessing Industry Risk by Ratio Analysis', Discussion Paper No. 1, Division of Research, School of Business, Indiana University.

below.

(1) Total debt plus preferred stock to cash flow (TD/CF). This ratio serves as an indicator of a firm's capacity to meet its 'debt' obligations. The inverse of the more common form of this ratio is used here in order to maintain an analytical structure such that the higher the ratio, the higher the risk. Beaver³⁷ has found this measure to be one of the more effective predictors of failure.

(2) One to total assets (1/TA). Asset size has received considerable attention recently as a risk indicator. It has been contended that larger firms have a lower probability of failure, strictly because of size. Using this theory, it was again necessary to generate an inverted ratio for analysis purposes. Examples of the use of total assets as a risk indicator can be found in Beaver³⁸ and Horrigan.³⁹

(3) Capital expenditures plus change in accounts receivable and inventory to gross plant plus accounts receivable and inventory (CE/GP). It can be argued that a firm experiencing a higher rate of growth is riskier than one with a lower growth rate. This is an intuitively appealing concept: new assets, whether resulting from replacement or expansion of current facilities or from branching to new areas, suggest greater risk. The ratio used here attempts to capture this phenomenon. Alternative measures of growth have been used by Beaver *et al.*,⁴⁰ Elton and Gruber,⁴¹ and Melnyk and Mathur⁴² in recent research.⁴³

(4) Sales to cash flow (S/CF). This ratio is a variation of the commonly used profitability measure, sales to operating income.⁴⁴ Cash flow is used in

³⁷Beaver, William H., 'Alternative Accounting Measures . . . and Market Prices, Financial Ratios . . .'

³⁸Beaver, William H., 'Alternative Accounting Measures . . . and Beaver, *et al.*, 'The Association Between Market . . .'

³⁹Horrigan, James O., 'The Determination of Long-Term Credit . . .'

⁴⁰Beaver *et al.*, 'The Association Between Market Determined . . .'

⁴¹Elton and Gruber, 'Improved Forecasting Through . . .'

⁴²Melnyk and Mathur, 'Business Risk Homogeneity . . .'

⁴³Both Beaver and Elton and Gruber included change in total assets to total assets as a growth measure. This ratio frequently yields negative ratios which present interpretation problems. Our measure seems to minimise this problem - at least no negative ratios were encountered in our sample. In addition, change in total assets to total assets measures net growth in assets. Since risk is involved in all new assets, the CE/GP measure seems preferable from this standpoint also.

⁴⁴For example, see Elton and Gruber, 'Improved Forecasting Through . . .'; Horrigan, James O., 'Some Empirical Bases . . . and 'The Determination of Long-Term Credit . . .'; and Melnyk and Mathur, 'Business Risk Homogeneity . . .'

lieu of operating income here because of our interest in default risk. It is feasible to have adequate income but nevertheless default because of cash flow problems. In addition, cash flow is less affected by accounting policies and procedures. Consequently, cash flow seems the better risk indicator.

As with the industry ratios, the company ratios are structured so that the higher the ratio, the higher the risk. Company data for the initial scaling of companies according to risk were drawn from the Compustat tapes for the then latest available period, namely, through the second quarter of 1973. A summary of the 39 companies, the corresponding ratios, and the industry to which each company belongs appears in Appendix B.

Analysis – the Scalogram Technique

In order to develop a scaling of the 39 companies according to risk based on consideration of the effect of relative industry risk and the four company ratios simultaneously, without having to assign weights to either the industry risk factor or the ratios, the partial order scalogram analysis method was used. This technique, introduced by Louis Guttman, is based mainly on the facet theory.⁴⁵ According to the method, each company has a 'profile' made up of company and industry elements (ratios). The scaling procedure is based on weak monotonic

ACCOUNTING AND BUSINESS RESEARCH

relations among the subjects (companies). This means that in order for one subject to be considered in an ordinarily higher category than another, at least one of the elements of its profile must be higher than that element for the other subject, and all of its other elements must be at least equal to the corresponding elements of the other subject. Brief illustrations of the application of the technique to (1) the industries and (2) the companies are presented below.

The data for three selected industries are reproduced from Appendix A in Table 1. For each ratio, industry 1 is higher than industry 2. Therefore, industry 1 can be considered riskier than industry 2. On the other hand, the same is not true for industries 2 and 3. Industry 2 is higher than industry 3 according to TD/EQ, but lower than industry 3 according to ATA/S and AAR/S. For TA/WC and FA/TA, industries 2 and 3 have equal ratios. Since no weights are attached to the ratios, industries 2 and 3 are considered not comparable.

The data in Appendix A reflect these comparability considerations for the 6 industries included in the study. The first 3 industries are comparable with one another and are listed in order from highest to lowest degree of risk as indicated by the industry factor (IF). The same is true for the second 3 industries, but none of the first 3 is comparable with the second 3 industries.

The data for three selected companies are reproduced from Appendix B in Table 2. Note that the

TABLE 1
Financial Ratios for Three Industries

Industry	TA/WC	FA/TA	ATA/S	TD/EQ	AAR/S
1. Electronic Computing Equipment	4	-3	-9	1.5	-15
2. Household Electrical Appliances	3	-2	-8	1.0	-13
3. Special Industry Machinery	3	-2	-7	-7	-18

Legend: See Appendix A.

TABLE 2
Ratios and Industry Factors for Three Companies

Company	TD/CF	I/TA	CE/GP	S/CF	IF
5. Dynalectron Corp.	9.57	-023	-77	34.68	6
10. Oak Industries	8.79	-018	-10	19.81	6
12. Unarco Industries	9.56	-016	-31	18.70	5

Legend: See Appendix B.

data consist of the 4 company ratios and an industry factor reflecting relative industry risk as defined in Appendix A.

For each of the 4 company ratios, company 5 is higher than companies 10 and 12, and for the industry factor, company 5 is equal to company 10 and higher than company 12. Therefore, company 5 can be considered riskier than companies 10 and 12. However, for companies 10 and 12, according to $1/TA$, S/CF , and IF , company 10 is higher than 12, but according to TD/CF and CE/GP , company 12 is higher. Since no weights are attached, companies 10 and 12 are considered not comparable.

Analysis of 39 Companies – The Industry Effect

The purpose of this section is to address the question of whether the industry effect is significant in analysing relative corporate risk. To do so, the scalogram analysis of relative risk for the 39 companies was performed for a single period (second quarter, 1972 – data shown in Appendix B), with and without consideration of the industry factor.

First, the companies were scaled according to risk as measured by the 4 company ratios only. The resulting scalogram is presented in Figure 1. Each company is identified in the scalogram by its company number according to Appendix B. The riskiest companies appear at the top beginning with companies 24, 3, 31, 2, 5, and 1, with risk declining gradually toward companies 39, 37, 34, 36, 32, and 22 at the bottom.

Only those companies connected by lines are comparable, in terms of risk, on *a priori* grounds. For example, company 5 is directly comparable with and is riskier than company 12 since each of the 4 ratios for company 5 is greater than or equal to the corresponding ratios for company 12 (see Appendix B). On the other hand, the riskiness of company 12 cannot be compared to the riskiness of company 7. Based on the ratios TD/CF and S/CF , company 7 is riskier than company 12. However, based on the ratios $1/TA$ and CE/GP , company 7 is less risky than company 12. Since the ratios can be compared only on an ordinal scale, we cannot compare companies 7 and 12 according to the composite measure of risk. This is true for all companies not connected by lines in the scalogram.⁴⁶

Figure 2 presents 3 scalograms indicating the ranking of the 39 companies according to risk as

measured by the 4 company ratios plus the industry factor. Aside from the inclusion of the industry factor, the underlying analysis and interpretation of these scalograms is the same as was described for Figure 1. The 3 separate scalograms in Figure 2 reflect the fact that no company in any one of these scalograms is comparable with any company in either of the other 2 scalograms. Thus, there are no connections among the scalograms.

Comparison of the scalograms in Figures 1 and 2 illustrates two important points. First, many of the companies remain comparable with the effects of the industry factor included. This is true for firms in industries 2 and 3 (e.g., companies 24 and 26, 35 and 37), and industries 4, 5 and 6 (e.g., companies 12 and 29, 13 and 30, 5 and 12, 16 and 32, 10 and 33, and 5 and 29). It is thus possible to make meaningful comparisons among companies on the basis of an analysis of the industry factor simultaneously with company variables. This would appear to provide a potential improvement over the research approach that isolates the industry effect by analysing only firms belonging to the same industry.⁴⁷ Second, many companies which are otherwise comparable (as illustrated in Figure 1) are shown to be not comparable when the industry factor is considered. For example, companies 1, 5, 18, and 31 would be considered riskier than companies 16, 15, 34, and 38, respectively, on the basis of the 4 company ratios only (see Figure 1). However, when the industry factor is included in the analysis, none of the first 4 companies is comparable with the second 4 (see Figure 2). In other words, if the industry factor is in fact a relevant variable for investment decision making, an incomplete analysis would have resulted from consideration of company variables alone. The technique thus also represents a potential improvement over approaches that ignore or isolate the industry effect and deal only with company factors.⁴⁸

Analysis – Relative Risk over Time

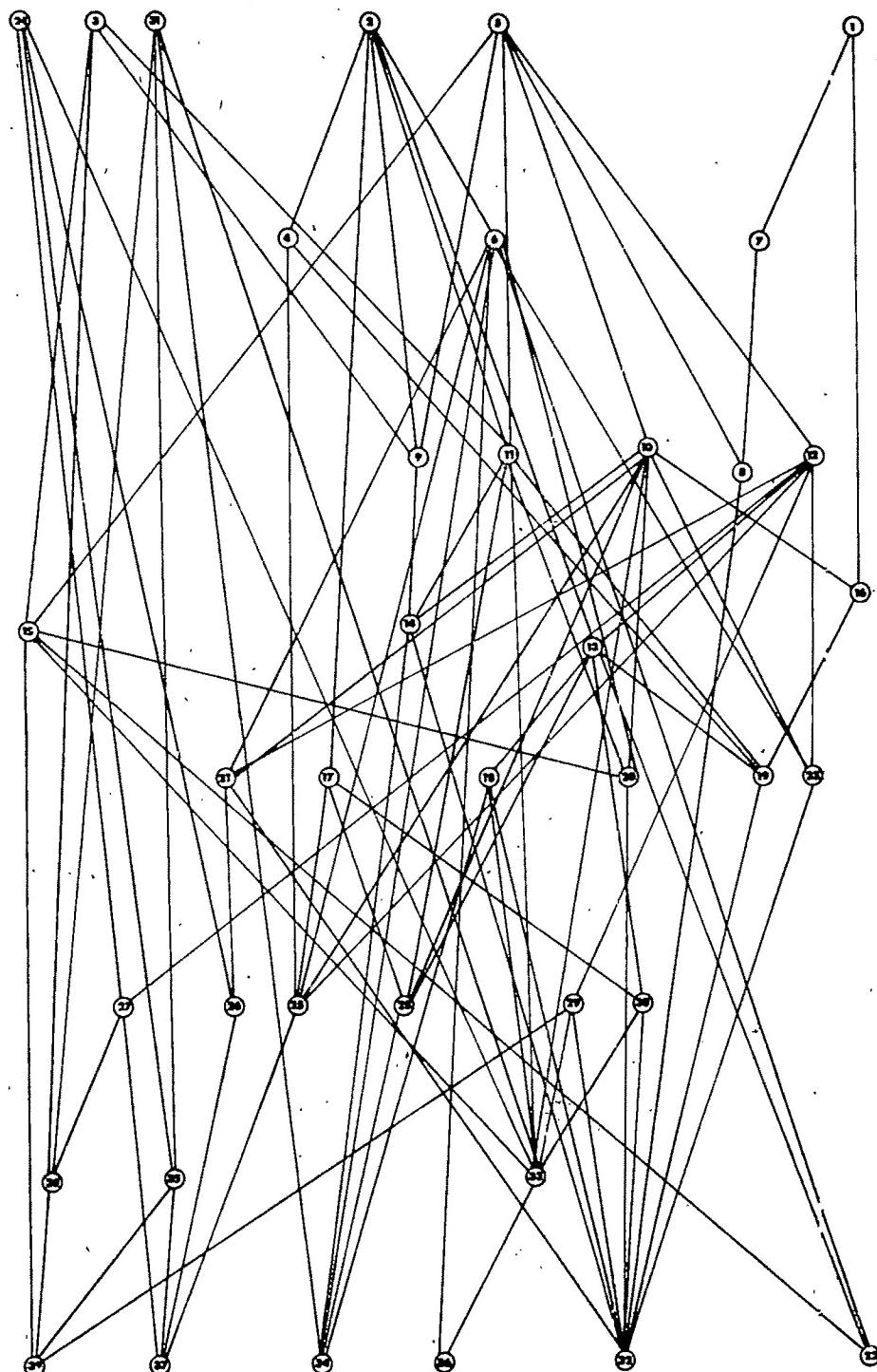
Analysis of relative risk over a number of time periods poses some interesting questions. Is there a meaningful pattern of relative risk relationships over time? Does the behaviour of relationships in prior periods provide an indication of what to expect in the future? The search for answers to these and related questions is the subject of this section. For the analysis of relative risk of the firms over time, risk measurement was based on simultaneous consideration of the 4 company ratios and the industry factors.

⁴⁶For an illustration of an application of the scalogram technique, see also Falk, Haim and Tsvi Ophir, 'The Effect of Risk on the Use of Financial Statements by Investment Decision-Makers: A Case Study', *The Accounting Review* (April 1973), 323–338.

⁴⁷Cf., Beaver, William H., 'Financial Ratios as Predictors . . .'

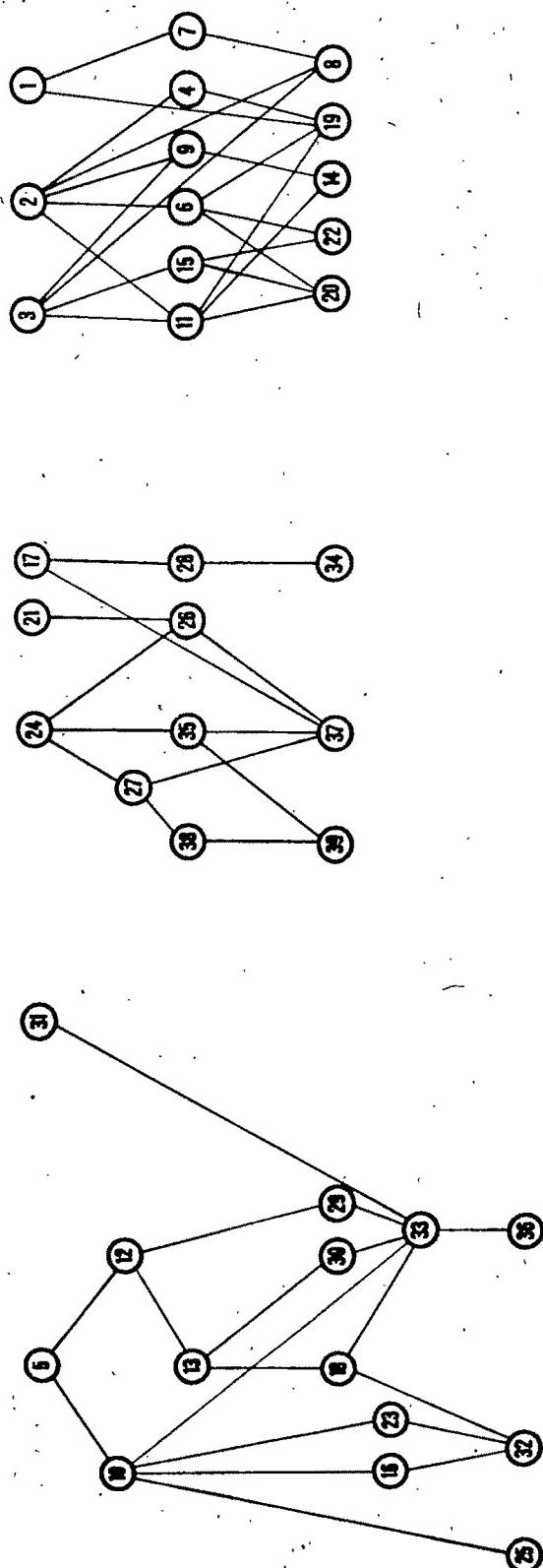
⁴⁸Cf. Horrigan, James O., 'The Determination of Long-Term Credit . . .'

Figure 1
Scalogram: Companies According to Risk – Company Ratios Only



Legend: The numbers in circles refer to the companies as identified in Appendix B.

Figure 2
Scalogram: Companies According to Risk - Company and Industry Variables



Legend: The numbers in circles refer to the companies as identified in Appendix B.

ACCOUNTING AND BUSINESS RESEARCH

Scalograms were developed for each of the 18 quarters, as explained in the preceding section. The relationships among the companies over time were then studied using pairwise analysis based on the relative risk positions reflected in the scalograms.

An example of the application of the pairwise analysis using quarter 9 as a reference point is provided in Table 3. This can be used to explain the technique. From the scalogram generated for quarter 9, 104 pairs of companies were identified which were comparable according to risk.

The basic objective of the analysis over time was to determine for any given quarter the percentage of pairs which held the same risk relationships as in quarter 9. The nature of the data base presented a minor problem in achieving this objective. New company and industry data became available only once a year, and frequently in different quarters for

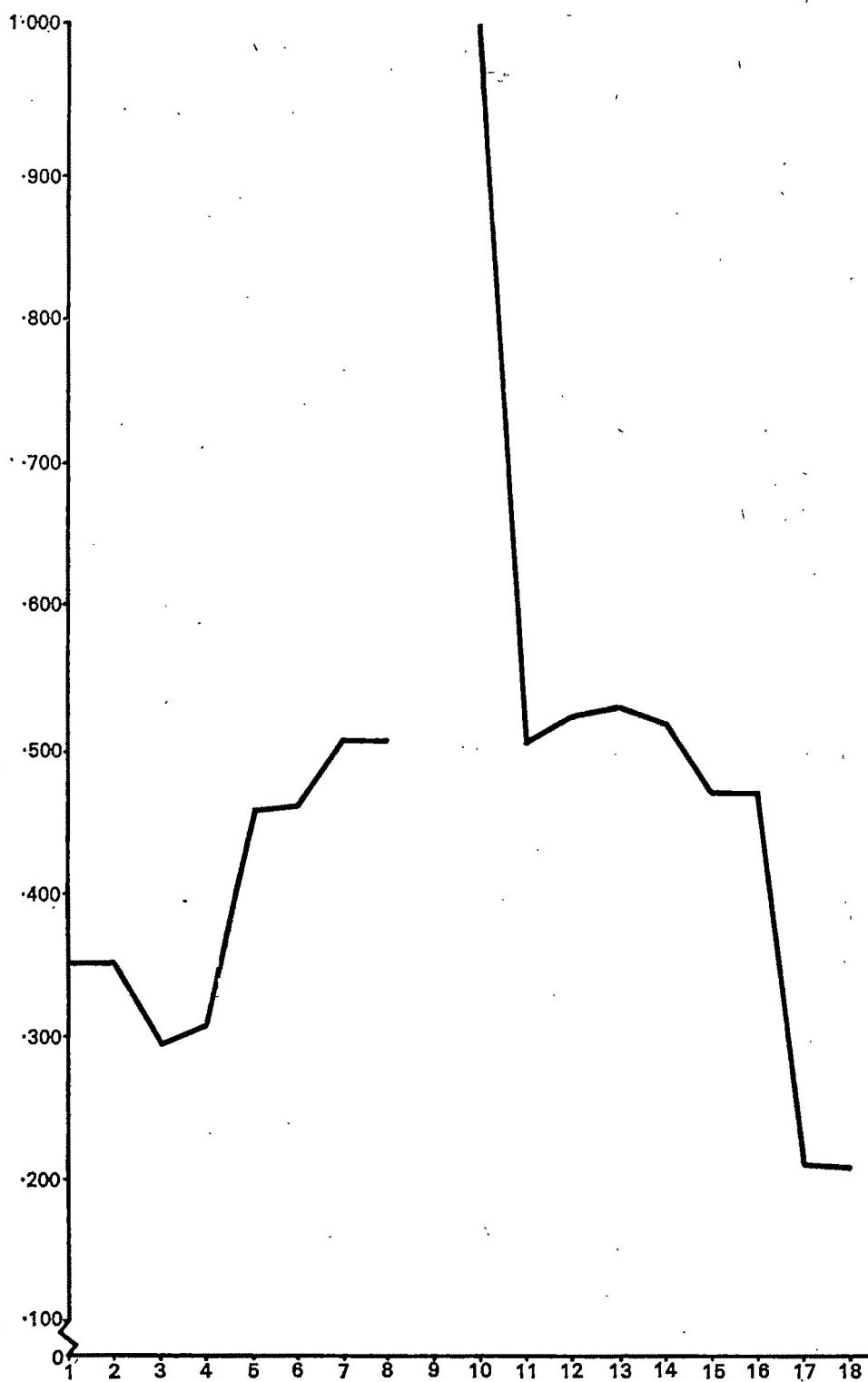
different companies and industries making up a given pair. Meaningful comparison of a relationship between a pair of companies in one quarter with that in another required that some data change have occurred, either for a company or industry. Otherwise, by definition the relationships would be the same in both quarters. Consequently, the comparisons between quarters are in terms of pairs which retain relationships out of those that could have changed. The corresponding percentages appear in column 4.

The percentages shown in column 4 of Table 3 are presented graphically in Figure 3. This graph and, to a lesser extent, the data in Table 3 illustrate an additional problem presented by the nature of the data base. Note that for adjacent quarters (e.g., 7 and 8, 9 and 10, 11 and 12), the percentages are either very similar or the same. This results from the fact that

TABLE 3
Pairwise Analysis of Risk Relationships
Base Period: Quarter 9

(1)	(2)	(3)	(4)
Quarter	Pairs which can change	Pairs which retain relationships	Percentage retaining relationship $((3) \div (2))$
1	104	37	.356
2	104	37	.356
3	104	31	.298
4	104	32	.308
5	104	48	.462
6	104	48	.462
7	104	53	.510
8	104	53	.510
9			
10	2	2	1.000
11	59	30	.508
12	65	34	.523
13	104	55	.529
14	104	54	.519
15	104	49	.471
16	104	49	.471
17	104	22	.212
18	104	22	.212

Figure 3
Pairs Retaining Relationships – Quarterly



for such adjacent quarters, very few of the pairs could change relationships. This condition holds true in every quarter; i.e., there is always an adjacent quarter with little data change. This made percentages and the analysis thereof for such quarters of questionable value.⁴⁹ This suggested that analysis of relationships at two-quarter intervals would be desirable. This approach is pursued below.

Data shown in Table 3 for 104 pairs for quarter 9 were generated for other groups of pairs for quarters 7 through 12. A summary of the results is provided in Table 4. The table shows for all quarters before and after the reference point (quarter), the percentages of pairs with the same relationships. To facilitate interpretation, these results are summarised graphically in Figures 4-11.

Figures 4-9 reflect the results of the analysis for reference quarters 7-12 using the two-quarter interval approach noted above. In other words, for example, Figure 4 plots the percentage of pairs from quarter 7 holding the same relationships in quarters 3, 5, 9, 11, 13, 15, and 17. These six graphs indicate at least two things. First, there is a fairly clear pattern of rapid and substantial decline in the percentage of pairs of firms holding a given risk relationship over time. Generally after only six to eight quarters, the percentage drops to 40, 30, or even 20 per cent.⁵⁰ Second, the figures suggest that the pattern of relative risk behaviour in periods prior to the reference point is not always a highly accurate predictor of the pattern for subsequent periods. It is true that the

overall pattern of rapid declines persists both before and after the reference point, but irregularities appear which would probably prove troublesome. For example, the upward turn between four and six quarters before the reference point in Figures 4 and 5 does not appear after the reference point. Similarly, the periods before the reference point in Figures 6 and 7 give little hint of the upward turn that appears between two and four periods after the reference point.

The behaviour of the curves presented in Figures 4-9 was analysed further in two different ways. First, the graphs were matched according to reference points as shown in Figure 10. This was done in an attempt to determine whether a time effect was operative, i.e., whether the percentage of pairs retaining relationships in any given period varied consistently with the length of time from the reference point. The results suggest that there is in fact a fairly strong time effect present; particularly in quarters after the reference point. With the clear exception of the movement two quarters after the reference point for base periods 9 and 10, there does

⁴⁹Analysis of the basic data and graphs thereof revealed that in fact deletion of adjacent quarters was necessary to avoid creating a false impression of a consistent pattern caused solely by the characteristics of the data base.

⁵⁰In an analysis using quarters 1, 2, 17 and 18 as reference points, which allowed comparisons for longer periods of time but only in one direction, percentages rarely fell below 20 per cent. Thus, the 'bottoming out' seems to come quite early.

Table 4

Summary: Retention of Risk Relationships - Quarters 7-12

Quarter \ Base Period	7	8	9	10	11	12
1	.400	.400	.356	.375	.318	.322
2	.373	.373	.356	.375	.318	.311
3	.360	.333	.298	.288	.285	.277
4	.360	.360	.308	.288	.296	.288
5	.528	.564	.462	.452	.428	.411
6	.556	.625	.462	.452	.428	.411
7		1.000	.510	.519	.439	.422
8	.800		.510	.519	.439	.422
9	.693	.707		1.000	.608	.612
10	.693	.693	1.000		.622	.630
11	.547	.547	.508	.517		.666
12	.573	.587	.523	.483	.666	
13	.360	.360	.529	.528	.736	.733
14	.360	.360	.519	.519	.714	.722
15	.320	.347	.471	.471	.560	.455
16	.333	.347	.471	.471	.582	.577
17	.187	.187	.212	.212	.296	.300
18	.187	.187	.212	.212	.274	.277

**Figures 4-9
Pairs Retaining Relationships—Two-Quarter Intervals**

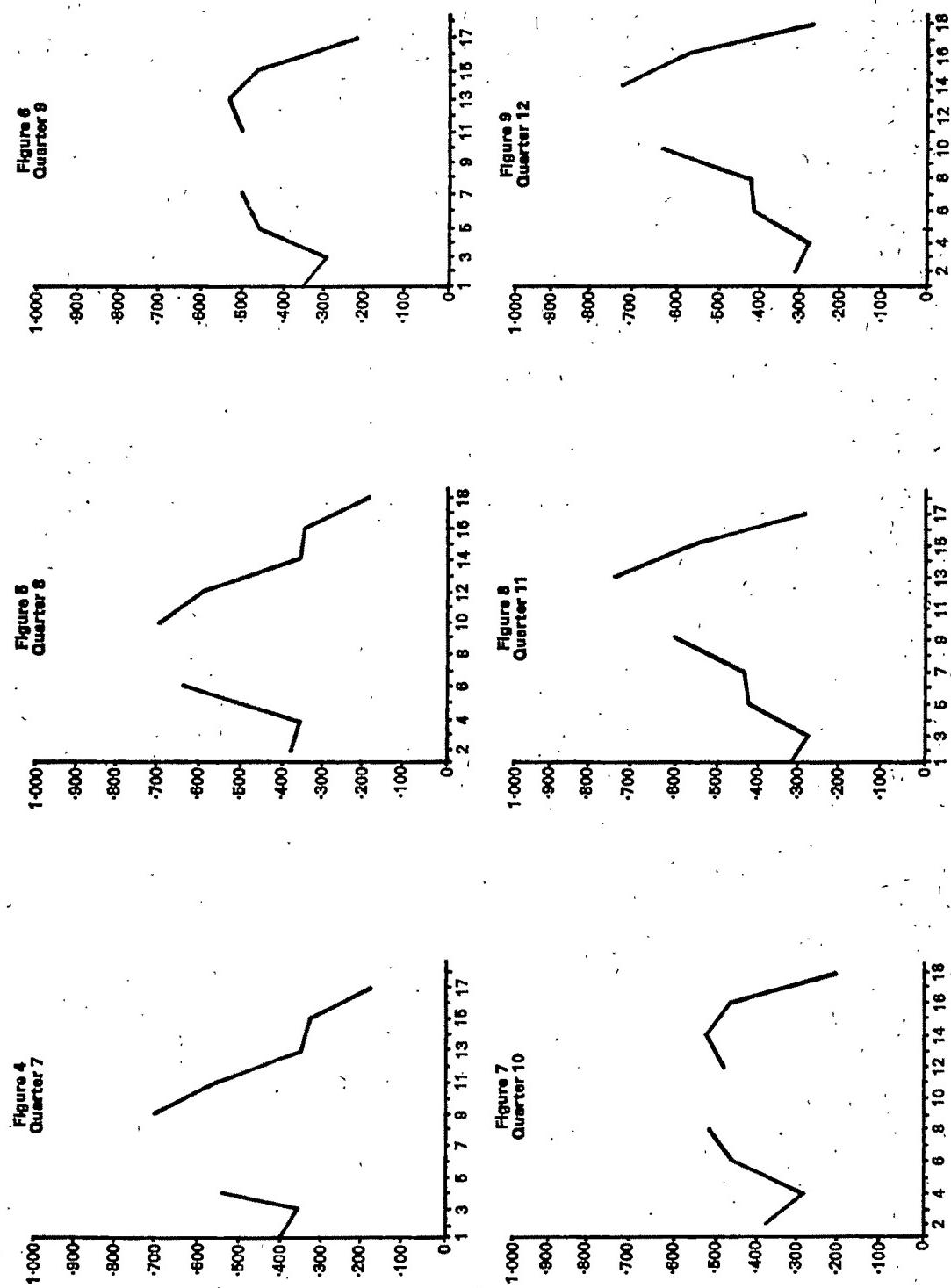
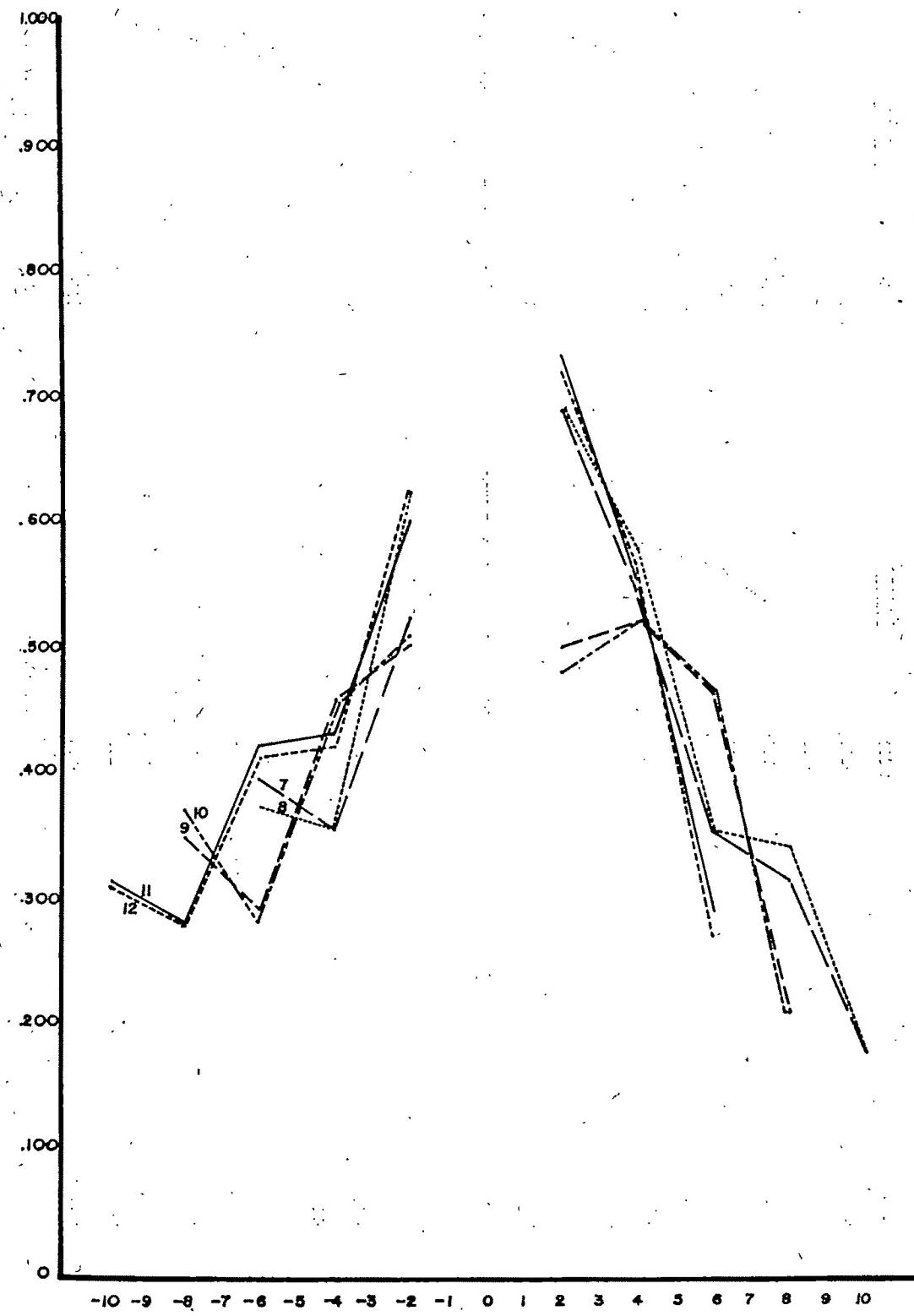


Figure 10
Curves Matched According to Reference Points



appear to be a common bond among the curves. The question raised by the irregularity observed for base periods 9 and 10 is addressed in the following paragraph.

The curves in Figures 4-9 were next matched according to time period, as shown in Figure 11.⁵¹ This was done in order to examine whether a period effect was operative, i.e., whether there was a common pattern of movement of percentages between particular periods, regardless of the distance from the reference point. The results are somewhat mixed. There seems to be a fairly strong period effect present in quarters 1-2, 3-4, and 17-18. Yet the movement in quarters 13-14 represents a distortion. Further, the irregularity noted in the preceding paragraph for base periods 9-10 in quarters 11-12 is not explained by an observable pattern across curves in this analysis. In general, it appears that both a period and a time effect are operative for the periods studied.

Summary and Conclusions

In this paper we have illustrated a technique for explicitly considering and including the industry

effect in determining relative corporate risk. The significance of the industry factor in ranking firms according to risk has been demonstrated, and potential improvements in prior research approaches have been suggested.

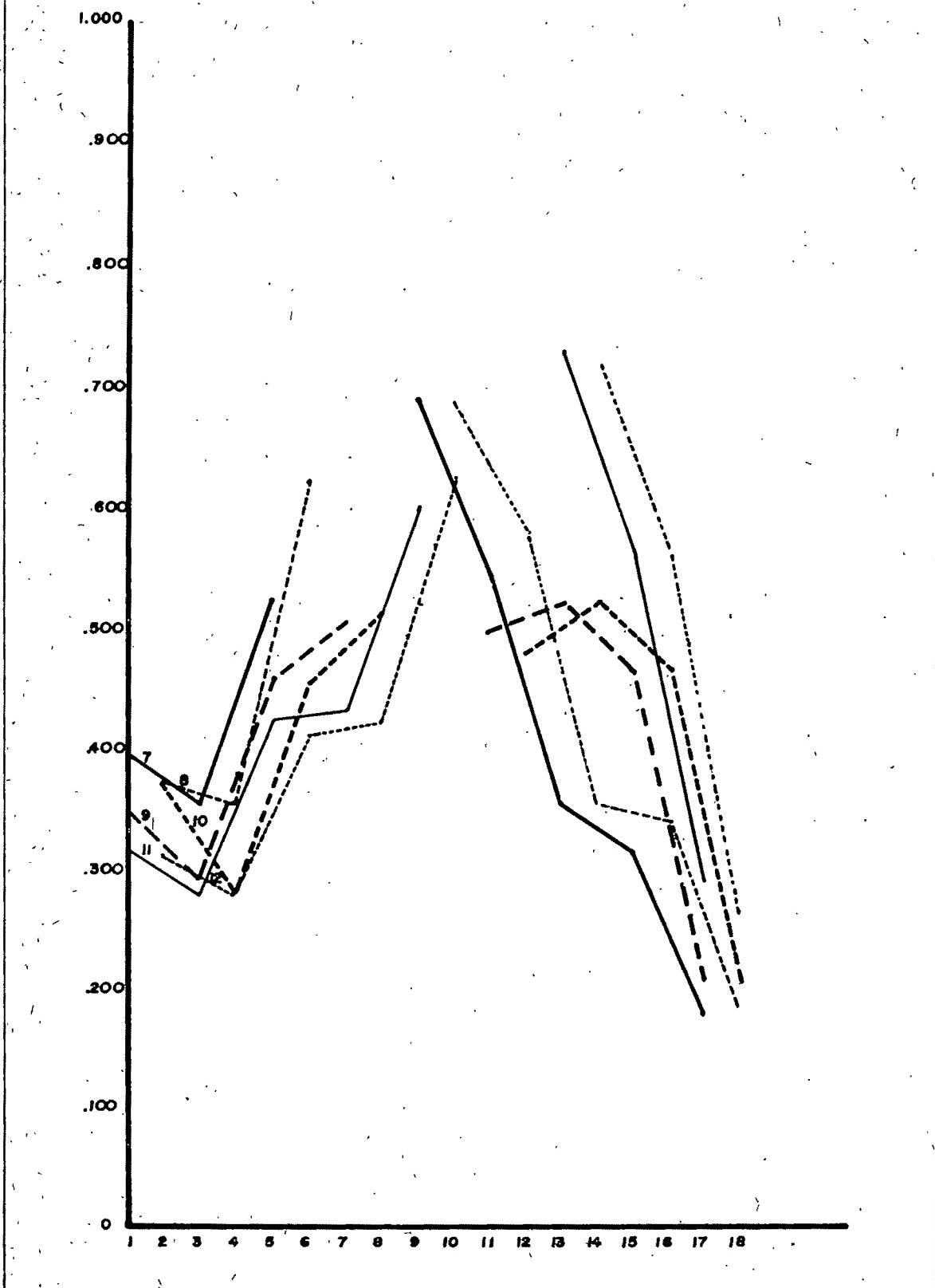
The analysis of the relative risk of firms over time shows a tendency for rapid and substantial decline in the percentage of firms holding a given relationship for periods before and after a reference point. As for the predictability of the pattern after the reference point, based on the observed pattern before the reference point, the results are too mixed to allow definitive conclusions. There is at least a consistent overall pattern. The search for possible time and period effects in the relative risk behaviour of the firms provides evidence that both are present. The conditions at a given point in time appear to be the result of the distance from the reference point and the characteristics of the period itself. Analysis of the overall pattern of the curves in Figures 10 and 11 provides weak evidence that the time effect is the more significant of the two, but further research is needed to deal fully with this question.

Acknowledgement

The authors wish to thank the International Business Research Institute of Indiana University for financial support of the research on which this report is based.

⁵¹The curves in Figure 11 have been re-phased one quarter in some cases. In developing the original curves, a two-quarter interval approach was used. Consequently, for even-numbered reference points no odd-number quarter measurements appear, and for odd-numbered reference points no even-numbered quarter measurements appear. Therefore, to facilitate analysis, odd and even quarters (e.g., 7 and 8, 9 and 10) have been matched.

Figure 11.
Curves Matched According to Time Period



APPENDIX A
6 Industries and their Ratios

<i>Industry Description</i>	<i>TA/WC</i>	<i>FA/TA</i>	<i>ATA/S</i>	<i>TD/EQ</i>	<i>AAR/S</i>	<i>IF</i>
Electronic Computing Equipment	4	.3	.9	1.5	.15	3
Household Electrical Appliances	3	.2	.6	1.0	.13	2
Department Stores	2	.2	.4	.9	.10	1
Electronic Components and Accessories	3	.3	.7	.8	.19	6
Special Industry Machinery	3	.2	.7	.7	.18	6
Perfumes, Cosmetics and other Toilet Preparations	2	.2	.6	.7	.18	4

Source : Robert Morris Associates Annual Statement Studies 1972. •

Legend:

- TA/WC* — Total assets to working capital.
- FA/TA* — Fixed assets to total assets.
- ATA/S* — Average total assets to sales.
- TD/EQ* — Total debt to stockholders' equity.
- AAR/S* — Average accounts receivable to sales.
- IF* — Industry factor.

•Data for the previous year for the Electronic Computing Equipment industry were not available in Robert Morris Associates' publication. Therefore the ratios for the previous year are based on the averages of all corporations in this industry listed on the Compustat tapes.

APPENDIX B**39 Corporations, their Ratios and their Industry**

No.	Company description	TD/CF	1/TA	CE/GP	S/CF	IF
1	City Stores Co.	14.43	.005	.08	60.02	1
2	Gaylor's National	9.50	.037	.15	59.50	1
3	Zayre Corp.	9.80	.003	.25	38.05	1
4	Wieboldt Stores Inc.	9.43	.017	.04	37.27	1
5	Dynalectron Corp.	9.57	.023	.77	34.68	6
6	Franklin Stores Corp.	5.42	.020	.15	38.31	1
7	Gimbels Bros. Inc.	9.88	.002	.06	30.47	1
8	R. H. Macy and Co. Inc.	8.52	.002	.06	24.42	1
9	Dayton-Hudson	8.81	.001	.11	23.89	1
10	Oak Inds.	8.79	.018	.10	19.81	6
11	Vornado	8.71	.003	.10	19.87	1
12	Unarco Inds.	9.56	.016	.31	18.70	5
13	Rex Chainbelt	7.52	.004	.14	18.62	5
14	May Dept. Stores Co.	7.10	.001	.08	19.08	1
15	Broadway Hale Stores	7.15	.002	.22	18.78	1
16	Avnet	7.02	.005	.05	18.84	6
17	Electronic Associated	7.88	.027	.11	15.48	3
18	Clark Equipment	5.69	.002	.13	16.94	5
19	Marshall Field and Co.	3.90	.003	.04	18.49	1
20	Associated Dry Goods Corp.	4.39	.002	.09	17.50	1
21	Magic Chef, Inc.	4.11	.016	.09	17.56	2
22	Federated Dept. Stores	3.36	.001	.13	17.95	1
23	Sola Basic Inds.	4.39	.013	.07	16.70	6
24	Hoffman Electronics	3.14	.039	.33	16.86	3
25	Microdot Inc.	5.25	.010	.03	14.49	6
26	National Presto Inds., Inc.	1.19	.014	.07	16.01	2
27	Apeco	2.30	.015	.31	13.38	3
28	Pitney-Bowes	5.46	.003	.07	9.85	3
29	Chesebrough Ponds	3.58	.004	.20	11.18	4
30	Revlon	4.70	.003	.11	9.99	4
31	Del Laboratories, Inc.	5.09	.043	.23	9.32	4
32	Caterpillar Tractor	3.64	.001	.04	9.54	5
33	Gillette	2.87	.002	.10	9.03	4
34	Burroughs	4.72	.001	.07	5.32	3
35	Wang Laboratories	1.28	.036	.21	7.77	3
36	Avon Products	1.43	.002	.10	7.22	4
37	Maytag Co.	.93	.010	.03	7.68	2
38	Xerox Corp.	1.76	.001	.23	3.89	3
39	Int'l Business Machines Corp.	1.12	.000	.16	3.55	3

Legend:

- TD/CF — Total debt plus preferred stock to cash flow.
 1/TA — 1 to total assets.
 CE/GP — Capital expenditure plus growth in receivables and inventory to gross plant plus receivables and inventory.
 S/CF — Sales to cash flow.
 IF — Industry (see Appendix A).

A Model for Accounting for Inflation

A. M. C. Morison

Introduction

It is attractive to argue as follows:

- 1 If there had been no inflation our pounds would have been, by definition, stated in terms of constant purchasing power.
- 2 We shall accordingly restate our balance sheets as they would have been if our pounds had maintained constant purchasing power.
- 3 By doing so we shall therefore have eliminated the distorting effects of inflation on our accounts.

We shall show in the course of this paper that the above argument cannot possibly be right (unless naturally 'the distorting effects of inflation' are defined to mean only what is eliminated by such a procedure). Our particular purpose is to analyse the significant effects of inflation on a conventional set of accounts and the effects of CPP adjustments to those accounts, for the sake of better understanding. In order to do this a (very simple) mathematical model is used; the points so made are demonstrable, not matters of opinion.

The expression 'inflationary profit' is defined in this paper to mean the extra profit that would not have been made if there had not been a drop in the general level of the purchasing power of money. 'Inflationary profit of the year' is defined to mean the inflationary profit caused by the year's inflation.

'The significant effects of inflation on a set of accounts' are considered in this paper to comprise three elements:

- (a) the inflationary profit of the year;
- (b) the understatement of asset figures resulting from those acquired in earlier periods being stated at the price levels ruling at the dates of acquisition;
- (c) the loss or gain in the purchasing power of the entity's capital caused by inflation during the year.

Items (a) and (b) above are the effects of inflation on the *number* of pounds recorded, and to be recorded, in the accounts; item (c) is its effect on the *value* of the pounds so recorded.

It is shown in the discussion that CPP accounting only by accident eliminates, and never in any event discloses, the full amount of the inflationary profit of the year, and does not show the inflationary loss or gain on capital. A simpler method of accounting for inflation, which achieves the second, and goes some way towards achieving the first, of these objectives is then suggested.

The Basic Model

In sections (i) to (iv) we build up the simplest possible general model of a conventional set of annual accounts in inflationary conditions, and compare as we go the effects of adjusting them under the CPP procedures. In section (v) we then relax in turn some of the principal restraints we have used, to show the consequences of varying our basic assumptions.

The simplifying assumptions used for the basic model are:

- (a) Stock is always held at the same quantity;
- (b) Purchases and sales accrue evenly and continuously throughout the year;
- (c) Both the buying and the selling prices of the firm's stock in trade rise strictly in line with inflation;
- (d) Depreciation is straight line, assets having no residual value;
- (e) There are no purchases or sales of fixed assets during the year;
- (f) There are no distributions of profit or changes in equity capital.

(g) It is a dream world, with no tax.

It follows from (a) and (e) above that the profit for the year must be held in the form of the increased cost of stock and monetary assets.

The following symbolism is used:

Time

Years = $t_0, t_1, t_2, \dots, t_k, \dots, t_n$

Stock turnover rate, per year = v

\therefore One lead-time (i.e. period
in which stock turns over),

in years = $1/v$

One lead-time earlier than t_n = $t_n - 1/v$
etc.

Quantities

Quantity in stock (constant and
positive) = q

Quantity bought and sold in
any year = Q

$\therefore Q$ = qv

Prices

Buying price of stock at t_0 = P_0

Buying price of stock at t_n = P_n

Selling price of stock at t_n = S_n

Cost of fixed assets bought at t_n = C_n

Depreciation

Length of life of fixed assets,

$$\begin{aligned} \text{in years} &= r \\ \therefore \text{Historical depreciation per year} &= C_k \frac{i}{r} \\ \text{And accumulated depreciation at } t_n &= C_k \frac{n - k}{r} \end{aligned}$$

We consider the year from t_n to t_{n+1} .

We use throughout a constant *nominal* rate of inflation – i.e. the same flat rate expressed in pounds, e.g.:

$$P_0 = 100, P_1 = 110, P_2 = 120, \text{ etc.}$$

This implies (a thing that is sadly improbable) a *diminishing* rate of inflation in real terms, and is used solely to confine attention to linear functions whose significance can be more easily grasped. The general reasoning and conclusions apply equally to an exponential model which implies a constant *real* rate of inflation – i.e. the same proportionate rate at every point of time.

We take the nominal inflation rate as a flat $i\%$ per annum starting from t_0 , the beginning of our time series. Thus:

$$\begin{aligned} P_0 &= P \\ P_1 &= P(1 + i) \\ P_n &= P(1 + in) \\ P_{n-1/v} &= P\{1 + i(n - 1/v)\} \end{aligned}$$

And so on.

(i) Fixed Assets

For simplicity we take the purchase date of all fixed assets to be t_0 .

$$\text{Historical cost of fixed assets at } t_n = C_0 = C$$

$$\text{Historical accumulated depreciation at } t_n = C \frac{n}{r}$$

$$\text{Historical book value at } t_n = C\left(1 - \frac{n}{r}\right)$$

We next give the formulae for the CPP accounts at t_{n+1} :

$$\begin{aligned} \text{Converted cost of fixed assets (at both } t_n \text{ and } t_{n+1}) \text{ in pounds of } t_{n+1} \\ = C\{1 + i(n + 1)\} \end{aligned}$$

$$\text{Converted book value at } t_n \text{ in pounds of } t_{n+1} \\ = C\left(1 - \frac{n}{r}\right)\{1 + i(n + 1)\}$$

$$\begin{aligned} \text{Converted book value at } t_{n+1} \text{ in pounds of } \\ t_{n+1} \\ = C\left(1 - \frac{n + 1}{r}\right)\{1 + i(n + 1)\} \end{aligned}$$

$$\text{Converted depreciation for year from } t_n \text{ to } t_{n+1} \text{ in pounds of } t_{n+1}$$

$$= C\left(1 - \frac{n}{r}\right)\{1 + i(n + 1)\}$$

$$\begin{aligned} &- C\left(1 - \frac{n + 1}{r}\right)\{1 + i(n + 1)\} \\ &= \frac{C}{r}\{1 + i(n + 1)\} \end{aligned}$$

(ii) Stock and trading profit

We plot price against time on the opposite page.

We first use FIFO. Historical cost of sales will be purchases from $t\left(n - \frac{1}{v}\right)$ to $t\left(n + 1 + \frac{1}{v}\right)$ (corresponding to the hatched area on the graph), with mean date at the mid-point, $t\left(\frac{2n + 1}{2} - \frac{1}{v}\right)$:

$$\therefore \text{Cost of sales} = QP\left\{1 + i\left(\frac{2n + 1}{2} - \frac{1}{v}\right)\right\}$$

Sales will of course run from t_n to t_{n+1} , with mean date at $t\frac{2n + 1}{2}$,

$$\therefore \text{Sales} = QS\left\{1 + i\left(\frac{2n + 1}{2}\right)\right\}$$

$$\begin{aligned} \therefore \text{Trading profit} &= Q[S\left\{1 + i\left(\frac{2n + 1}{2}\right)\right\} - \\ &\quad P\left\{1 + i\left(\frac{2n + 1}{2} - \frac{1}{v}\right)\right\}] \\ &= Q\{(S - P) + \\ &\quad (S - P)i\left(\frac{2n + 1}{2}\right) + \frac{Pi}{v}\} \end{aligned}$$

$$\text{And since } v = \frac{Q}{q},$$

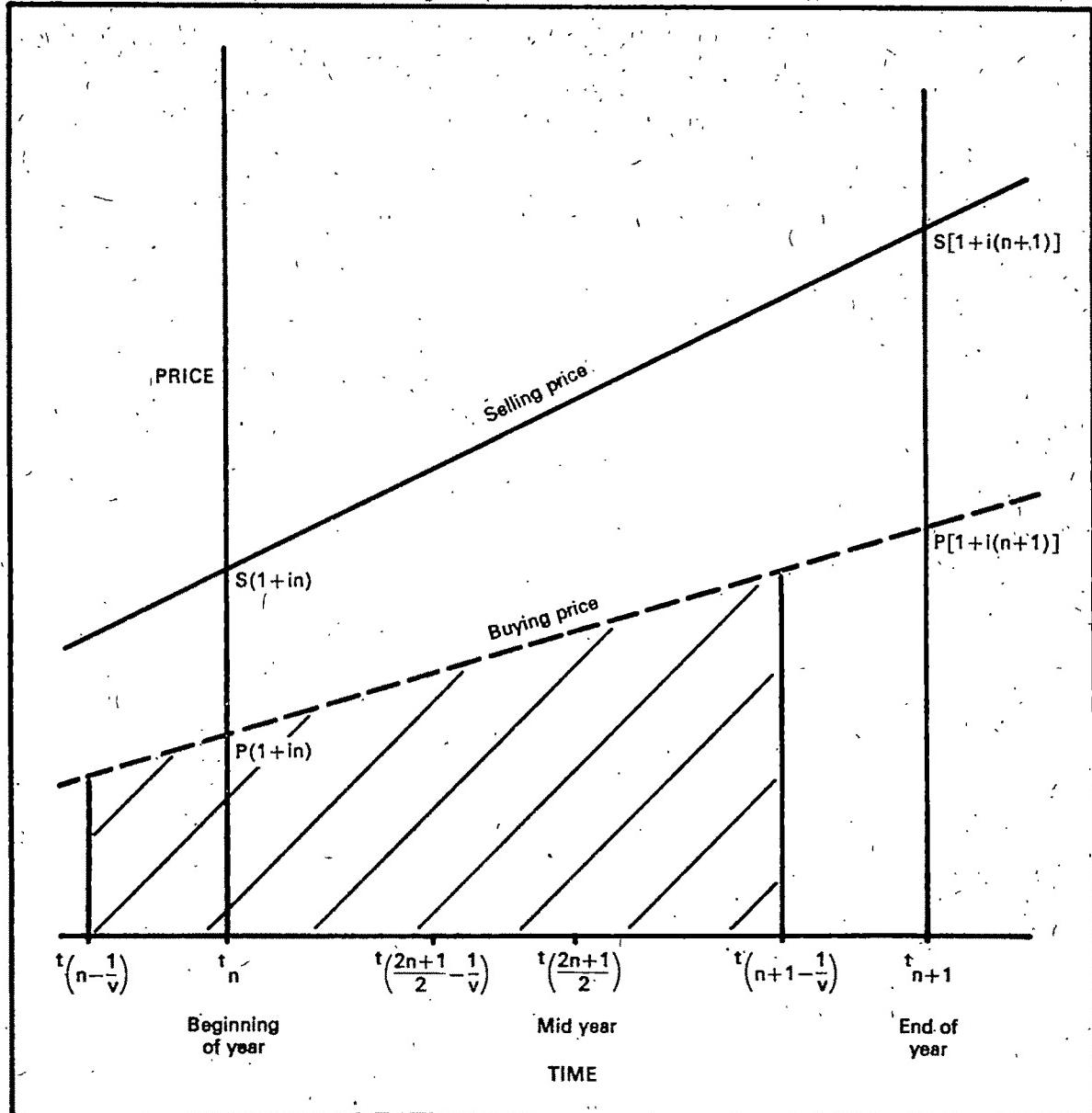
$$\begin{aligned} \text{Trading profit} &= Q(S - P) + \\ &\quad Q(S - P)i\left(\frac{2n + 1}{2}\right) + Piq \end{aligned}$$

Profit without inflation is obviously the first term, $Q(S - P)$. It follows that the inflationary profit under FIFO is the sum of the last two terms:

$$Q(S - P)i\left(\frac{2n + 1}{2}\right) + Piq$$

The first of these terms, $Q(S - P)i\left(\frac{2n + 1}{2}\right)$, is the increase in profit margin caused by inflation up to the end of the year – i.e. it is the *average* rate ruling during the year. Observe that it is a function of Q , the quantity sold, and not of q , the quantity of stock (except insofar as our definitions $\rightarrow Q = qv$). The second of these terms, Piq , is the stock profit – the full year's inflationary increment on the quantity (here taken to be constant) held in stock. The point to observe is that the stock profit is only part of the inflationary profit under FIFO.

It is convenient to think of the first term in the previous paragraph, $Q(S - P)i\left(\frac{2n + 1}{2}\right)$, being



split into its two constituent parts – namely, the effect of inflation up to the beginning of the year, and the further effect of inflation up to the end of the year:

$$Q(S - P)i \left(\frac{2n + i}{2} \right) = Q(S - P) \frac{i}{2} + Q(S - P)in$$

$Q(S - P) \frac{i}{2}$ is plainly the effect of the average rate

of inflation during the year on the profit margin on sales – that is, the amount, exclusive of the stock profit, by which inflation during the year has improved the results of trading. $Q(S - P)in$ is accordingly the balance – i.e. the effect that inflation

up to the beginning of the year had on the results of trading during the year. It follows that the total amount of trading profit caused by inflation during the year is:

$$Q(S - P) \frac{i}{2} + Piq$$

We next take the base stock method. The quantity held in stock now does not affect profit, so that purchases, like sales, will run from t_n to t_{n+1} .

$$\text{Profit} = Q [S \{1 + i \left(\frac{2n + i}{2} \right)\} - P \{1 + i \left(\frac{2n + i}{2} \right)\}]$$

$$= Q(S - P) + Q(S - P)i \left(\frac{2n + i}{2} \right)$$

Profit without inflation is $Q(S - P)$, as before. The second term is therefore the inflationary profit which is not corrected by the base stock method. It is of course the same as the corresponding inflationary profit under FIFO – i.e. the increase in profit margins caused by inflation up to the beginning of, and during, the year.

We next take the CPP method of accounting for stock kept on the FIFO basis. Opening stock will have been bought at the mid-point of the lead-time previous to t_n , i.e. at $t\left(\frac{n}{2}\right)$.

$$\begin{aligned} \text{∴ Opening historical stock} &= \\ Pq\{1 + i\left(n - \frac{i}{2v}\right)\} & \\ \text{Similarly, closing historical stock} &= \\ Pq\{1 + i\left(n + i - \frac{i}{2v}\right)\} & \\ \text{Opening and closing stock in pounds of } t_{n+1} &= \\ Pq\{1 + i(n + i)\} & \\ \text{∴ Net deduction from profit for CPP} &= \\ [Pq\{1 + i(n + i)\} - \\ Pq\{1 + i\left(n - \frac{i}{2v}\right)\}] - \\ [Pq\{1 + i(n + i)\} - \\ Pq\{1 + i(n + i) - \frac{i}{2v}\}] & \\ Pq\{1 + i\left(n + i - \frac{i}{2v}\right)\} & \end{aligned}$$

$$Pq\{1 + i\left(n - \frac{i}{2v}\right)\}$$

$$= Piq$$

The net deduction from profit is thus the stock profit, just as it is under base stock.

The interesting point follows that the inflationary profit which is left in the results by CPP accounting is the same as that which is left in by the base stock method – namely $Q(S - P)i\left(\frac{2n + i}{2}\right)$, the total inflationary increment on the profit margin during the year. Part of the CPP adjusted profit is therefore directly attributable to inflation during the year. The only cases in which the CPP method would remove the whole of the inflationary profit is where $S = P$ (no profit is being made) or $i = 0$ (there is no inflation).

(iii) Net Monetary Assets

Since there is no movement in fixed assets, net monetary assets at any point of time are a function of both trading profit and stock. We shall let the net monetary assets at t_n be M .

$$\begin{aligned} \text{∴ Total net monetary assets at } t_{n+1} &= \\ M + \text{trading profit} - \text{increase cost of stock} & \\ = M + [Q(S - P)\{1 + i\left(\frac{2n + i}{2}\right)\} & \\ + Piq] - Piq & \\ = M + Q(S - P)\{1 + i\left(\frac{2n + i}{2}\right)\} & \end{aligned}$$

Under CPP the net monetary assets at t_n , in pounds of t_{n+1} , will be $M \left\{ \frac{1 + i(n + i)}{1 + in} \right\}$

(iv) Accounts

We can now assemble the accounts. We use first the historical FIFO, and secondly the CPP, basis.

(a) Net assets – historical FIFO

	t_n	t_{n+1}
Book value of fixed assets	$C\left(1 - \frac{n}{r}\right)$	$C\left(1 - \frac{n + i}{r}\right)$
Stock	$Pq\{1 + i\left(n - \frac{i}{2v}\right)\}$	$Pq\{1 + i\left(n + i - \frac{i}{2v}\right)\}$
Net monetary assets	M	$M + Q(S - P)\{1 + i\left(\frac{2n + i}{2}\right)\}$

(b) Net assets – CPP (pounds of t_{n+1})

Book value of fixed assets	$C\left(1 - \frac{n}{r}\right)\{1 + i(n + i)\}$	$C\left(1 - \frac{n + i}{r}\right)\{1 + i(n + i)\}$
Stock	$Pq\{1 + i(n + i)\}$	$Pq\{1 + i(n + i)\}$
Net monetary assets	$M \left\{ \frac{1 + i(n + i)}{1 + in} \right\}$	$M + Q(S - P)\{1 + i\left(\frac{2n + i}{2}\right)\}$

The respective profits for the year are (by definition) the differences between the two net assets statements. We set them out in parallel:

	<i>Historical FIFO</i>	<i>CPP</i>
Trading profit without inflation	$Q(S - P)$	$Q(S - P)$
Total inflationary increment on trading profit during the year	$Q(S - P)i \left(\frac{2n + i}{2} \right)$	$Q(S - P)i \left(\frac{2n + i}{2} \right)$
Stock profit	Piq	—
Deduct: Depreciation: historical cost	$\frac{C}{r}$	$\frac{C}{r}\{i + i(n + i)\}$
in pounds of t_{n+1}	—	$M \left\{ \frac{i + i(n + i)}{i + in} - i \right\}$ $= \frac{M_i}{i + in}$
Deduct: Net monetary loss	—	—

The quantum of the CPP adjusted profit is always, on any basis of computation, as shown above.¹ The first two components of the profit remain the same under either system: the average inflationary increment on trading profit due to the year's inflation —

$Q(S - P)\frac{i}{2}$ — is accordingly included in both. The

CPP system does not *eliminate* — as many perhaps suppose — the effect of inflation on trading profit from the accounts; it leaves it in. Nor, on the layout suggested in the provisional accounting standard, does it disclose how much this effect is.

(v) Variations in assumptions

We shall now relax certain of the restraints, one at a time, that we have employed in our model so far. It is only necessary to consider variations concerning stock and trading profit.

The simple model considered previously proceeded on the assumption that inflation affected sales and purchases both simultaneously and equally. This is extremely unlikely to be true in fact. It depends on what policy is being followed on fixing selling prices. For example, if a company does not increase selling prices until, and only to the extent

that, increased replacement prices actually flow through into the cost of sales, or if it uses the base stock method, or if it does not increase selling prices during the relevant period at all, it makes *no* inflationary profit on holding stocks, and the CPP adjustment of stock accordingly removes something that isn't there to begin with. Legislation on price control is increasingly moving towards restricting pricing policies in this kind of way. The consequence of not being able in practice to increase prices continuously is similar, although naturally not equal, in effect. Again, if the quantity of stock changes during the year, deducting under CPP a stock profit based solely on opening stock will eliminate only by chance the amount of stock profit actually earned. It accordingly does not look as though a single blanket adjustment will properly account for inflation in widely divergent circumstances.

(a) No stock profit earned

Suppose first that the increased buying price of stock is only reflected in increased selling prices when such stock enters into cost of sales. Although still using the FIFO basis, there is now no inflationary profit from buying stock at one price level and selling it at a higher one.

We keep all our remaining restraints the same as before. The only difference is accordingly the selling price, which at the beginning of the year is now related to the start of the last lead-time in the preceding year, just as the buying price is:

$$\begin{aligned} S_n &= S \left\{ i + i \left(n - \frac{i}{v} \right) \right\} \\ S_{n+1} &= S \left\{ i + i \left(n + i - \frac{i}{v} \right) \right\} \\ \therefore \text{Sales} &= QS \left\{ i + i \left(\frac{2n + i}{2} - \frac{i}{v} \right) \right\} \end{aligned}$$

¹The particular method suggested in the English Institute's 'Working Guide' also requires, presumably for purposes of presentation, that the average inflationary increment on the trading profit of the year (excluding the stock profit) should further be *increased* by the rate of inflation during the final half-year, and that the same amount should equally be *charged* as an additional part of the net monetary loss. This contra entry has the approximate effect of stating the trading profit in end-of-the-year pounds, and of showing the net monetary loss on the accruing profit as it was turned into monetary assets during the year. The final result of course remains the same as that shown above.

And as before,

$$\text{Cost of sales} = QP \left\{ 1 + i \left(\frac{2n+i}{2} - \frac{i}{v} \right) \right\}$$

\therefore Trading

$$\begin{aligned}\text{profit} &= Q(S - P) + \\ &\quad Q(S - P) i \left(\frac{2n+i}{2} - \frac{i}{v} \right) \\ &= Q(S - P) + Q(S - P) \frac{i}{2} + \\ &\quad Q(S - P) i \left(n - \frac{i}{v} \right)\end{aligned}$$

The inflationary profit is therefore the sum of the last two terms. $Q(S - P) \frac{i}{2}$ is, as before, the effect of inflation during the year on the profit margin on sales. The second term again shows the effect of inflation up to the beginning of the year; on the present hypothesis this is smaller by the factor $\frac{i}{v}$ than under conventional FIFO, since selling prices in the first year will not have started to rise until one lead-time later than t_0 . By reason of our changed hypothesis there is now no stock profit, no Piq.

The effect of the CPP stock adjustment, however, is still to deduct Piq from the trading profit, whether the business has in fact made a stock profit or not.² The inflationary profit (or loss) under CPP, insofar as it relates to inflation during the year, therefore becomes:

$$Q(S - P) \frac{i}{2} - \text{Piq}$$

There is no way of generalising whether this expression will be necessarily positive, negative or zero; it depends on the relationship of selling price, buying price and lead-time. In these circumstances the CPP stock adjustment may be removing some, or all, or more than all, the inflationary profit of the year: there is no rule for telling which.

(b) No increase in selling price

We next suppose that there was no increase in selling prices during the period, while costs continued to rise in line with inflation. We use conventional FIFO; all other restraints remain unchanged.

Amount of sales income

$$\begin{aligned}\text{foregone by not putting up} \\ \text{prices this year} &= QS \frac{i}{2}\end{aligned}$$

Profit due to inflation of the

²More precisely, it is understood from students of CPP that this is intended to be the procedure: the point is not mentioned in the provisional standard.

ACCOUNTING AND BUSINESS RESEARCH

year under conventional
FIFO

$$\begin{aligned}&= Q(S - P) \frac{i}{2} \\ &\quad + \text{Piq} \\ \therefore \text{Profit (loss) still due to} \\ \text{inflation of the year} &= Q(S - P) \frac{i}{2} + \\ &\quad \text{Piq} - QS \frac{i}{2} \\ &= \text{Piq} - QP \frac{i}{2}\end{aligned}$$

As always, the CPP stock adjustment deducts Piq from the trading profit regardless of the facts. Therefore the trading loss resulting from inflation during the year, which is in this case left in the results after CPP, is:

$$\begin{aligned}\text{Piq} - QP \frac{i}{2} - \text{Piq} \\ = - QP \frac{i}{2}\end{aligned}$$

In this (very special) case we are at least able to generalise the CPP result: it always gives a trading loss due to inflation of the year.

(c) Profit margin not in line with inflation

We thirdly suppose that the profit margin does move as a result of inflation during the year, on a straight-line function, but not by the same amount as the actual rate of inflation (it may be more or less). Conventional FIFO and other restraints are as before. We let the inflationary increase in the profit margin since the last lead-time of the previous year be at the rate of j per annum ($j \neq i$):

Increment in trading

$$\begin{aligned}\text{profit due to inflation} \\ \text{during the year} &= Q(S - P) \frac{j}{2} + \text{Pjq}\end{aligned}$$

As before, the CPP adjustment deducts Piq from trading profit. Therefore the trading profit or loss resulting from inflation during the year which is left in after CPP is:

$$\begin{aligned}Q(S - P) \frac{j}{2} + \text{Pjq} - \text{Piq} \\ = Q(S - P) \frac{j}{2} - \text{Pq}(i - j)\end{aligned}$$

As in the first variant considered, there is again no way of generalising whether this expression will be positive, negative or zero: it may be any of these.

(d) Changing rates of inflation

We now suppose that the rates of inflation in two successive years are not the same, other restraints remaining. We suppose a flat rate of i up to t_n , and

a rate of m in the year to t_{n+1} . We use conventional FIFO, and deal with the inflationary profits of each successive year after CPP has eliminated the stock profit.

Profit due to inflation on

$$\text{margins during year } t_{n-1} \text{ to } t_n = Q(S - P) \frac{i}{2}$$

Restated in pounds of

$$t_{n+1} = Q(S - P) \frac{i}{2} (1 + m)$$

Profit due to inflation on

$$\text{margins during year } t_n \text{ to } t_{n+1} = Q(S - P) \frac{m}{2}$$

If these were the same,

$$Q(S - P) \frac{i}{2} (1 + m) = Q(S - P) \frac{m}{2}$$

$$\therefore i = \frac{m}{1 + m}$$

It follows that:

$$\text{If } i > \frac{m}{1 + m}, \quad \text{LHS} > \text{RHS}$$

$$\text{If } i < \frac{m}{1 + m}, \quad \text{LHS} < \text{RHS}$$

The inflationary profit on margins of the two years, after the earlier year has been restated under CPP in pounds of the latter, will accordingly differ with the different rates of inflation except in one, very special, case.

(e) Changes in quantity of stock

We finally take the case where the quantity of stock alters during the year, all other factors and conventional FIFO remaining unchanged. We shall assume that the same quantity remains in sales (and therefore in cost of sales) as before, but that closing stock now represents the purchases of the final five 'lead-times' of $\frac{I}{v}$ (instead of purchases of the final lead-time only). The increased rate of purchases that this implies will be taken to have run evenly from $t\left(\frac{2n+1}{2} - \frac{1}{v}\right)$ to the end of the year, so that one-half of the cost of sales will have been bought at the old rate. q now relates to opening stock only; although $v \neq$ the revised rate of stock turnover during the year, $Q = qv$ continues to hold. Historical cost of sales will therefore be Q purchased from $t\left(\frac{1}{v}\right)$ to

$t\left(\frac{2n+1}{2} - \frac{1}{v}\right)$, with mean date at the mid-point

$t\left(\frac{4n+3}{4} - \frac{1}{v}\right)$, and Q purchased from $t\left(\frac{2n+1}{2} - \frac{5}{v}\right)$

to $t\left(\frac{n+1}{2} - \frac{5}{v}\right)$, with mean date at the mid-point $t\left(\frac{4n+3}{4} - \frac{3}{v}\right)$.

$$\therefore \text{Cost of sales} = \frac{QP}{2} \left\{ 1 + i \left(\frac{4n+1}{4} - \frac{1}{v} \right) \right\} \\ + \frac{QP}{2} \left\{ 1 + i \left(\frac{4n+3}{4} - \frac{3}{v} \right) \right\} \\ = QP \left\{ 1 + i \left(\frac{2n+1}{2} - \frac{2}{v} \right) \right\}$$

$$\text{Sales, as before} = QS \left\{ 1 + i \left(\frac{2n+1}{2} \right) \right\}$$

$$\therefore \text{Trading profit} = Q \left[S \left\{ 1 + i \left(\frac{2n+1}{2} \right) \right\} \right. \\ \left. - P \left\{ 1 + i \left(\frac{2n+1}{2} - \frac{2}{v} \right) \right\} \right] \\ = Q \left\{ (S - P) + \right. \\ \left. (S - P) i \left(\frac{2n+1}{2} \right) + \frac{2Pi}{v} \right\}$$

$$\text{And since } v = \frac{Q}{q}$$

$$\text{Trading profit} = Q(S - P) + \\ Q(S - P)i \left(\frac{2n+1}{2} \right) + 2Piq$$

The inflationary profit comprises the last two terms shown above, of which the stock profit is $2Piq$. The CPP adjustment on opening stock, which removes little more than half of this, is:

$$Pq \left\{ 1 + i \left(n + 1 \right) \right\} - Pq \left\{ 1 + i \left(n - \frac{1}{2v} \right) \right\} \\ = Piq \left(1 + \frac{1}{2v} \right)$$

(The remainder of the CPP adjustment of stocks is of course an *addition* to profit on the – in this case greatly increased level of – closing stocks). It follows that the remainder of the stock profit remains in the CPP adjusted profit.

If we compare the above expression with the formula for conventional FIFO using a constant quantity of stock, we can see that the only difference is $2Piq$ instead of Piq . This occurs because, by increasing our closing stock quantity, we have shifted the mean date of cost of sales one lead-time $\left(\frac{1}{v}\right)$ back in time, when purchase prices had not risen so far. We illustrate the effect of inflation during the year on cost of sales – and therefore on trading profit – taken at different mean dates:

$$\text{Mean date } t\frac{2n+1}{2} \text{ (i.e. mid-year)} = PQ \frac{i}{2}$$

$$\text{Mean date } t_{\frac{2n+1}{2}} = \frac{i}{v} = Pqvi \left(\frac{1}{2} - \frac{i}{v} \right) = PQ \frac{i}{2} - Piq$$

$$\text{Mean date } t_{\frac{2n+1}{2}} = \frac{k}{v} = Pq \frac{i}{2} - kPiq$$

Increasing the quantity of closing stock implies, when using FIFO under inflationary conditions, increasing stock profits; reducing the quantity implies the reverse.

Comments on CPP

The foregoing considerations raise questions of some interest. First, an anomaly: one cannot, in the same set of accounts, *both* eliminate the effect of inflation from the profits *and* state the answer in end-of-the-year pounds. If there had been no inflation during the year one would still, by definition, be counting in beginning-of-the-year pounds: if, on the other hand, one is counting in end-of-the-year pounds, they will themselves have inflated during the year one is seeking to account for. It follows that it cannot be of assistance to hypothesise, as CPP does, that the whole of the rise in prices which had taken place by the end of the year had in fact taken place by the beginning.

Secondly, a statement not far from the obvious: one cannot deal with the effect of inflation on trading profits by means of operating solely on the figures in the balance sheet; the necessary information is not there. As a consequence, CPP accounts neither eliminate nor disclose the effect of the current year's inflation on the profit margin on sales; they leave it in without mention. According as the rate of inflation varies from one year to another, and according as the effect of that inflation on the profit margin varies from one year to another, so will the inflation-adjusted results fluctuate too. It is inflation itself that will make them vary. That is not, we think, what is meant by accounting for inflation.

Thirdly, the CPP accounts remove from conventional profit an amount equal to the stock profit - Piq - regardless of whether it has been earned in its entirety, or partially, or not at all. The (apparent) argument is an example of Morton's Fork:

Either you have earned the stock profit, in which case you must remove it in order to show your 'real' profits;

Or you have not earned the stock profit, in which case you must charge an equivalent amount to show the loss of purchasing power on the capital tied up in your stock.

The consequence is that the CPP profit will vary

ACCOUNTING AND BUSINESS RESEARCH

directly from year to year and company to company with whether or not an inflationary stock profit has in fact been made, and if so, with how large it is; and it will not disclose what that figure is. In a case where the full inflationary stock profit has been earned the CPP-adjusted profit will be that much bigger than in a case where it has not been earned. Yet without inflation itself there could not be an inflationary stock profit. That again is not what we understand by accounting for inflation.

Finally, inflation does not only produce an effect on income: it produces an effect on capital. CPP accounts, even though constructed from balance sheet figures, do not show the shareholder the separate effect of inflation on his capital funds, or the extent to which that capital has been eroded or safeguarded as the result of the disposition of assets and liabilities during the year. This is a question wholly independent from showing the profit or loss on trading. The holder of capital automatically suffers a loss in a time of inflation, except to the extent that he can invest it in non-monetary assets or can borrow. He suffers his loss of capital whether he is trading or not: it follows from the meaning of the words that it cannot be a trading loss. Trading profit or loss is his reward for venturing the part of his capital that he did not lose. The loss due to the fall in the general purchasing power of money is something quite distinct, and what we understand by accounting for inflation would keep it so.

If accounting for inflation under the CPP proposals neither eliminates the significant effects of inflation from the accounts nor discloses how much they are, what is it doing? And how are its results to be assessed? Can 'accounting for inflation' be defined in any way other than by showing what effect inflation has had?

Suggested method of inflation accounting

As long as we are retaining the historical cost convention at all, it seems that the purpose - and the understanding - of inflation accounting may be better served by setting out to answer these two sets of two questions:

- (a) (i) How much profit did we make from trading?
 (ii) How much of that profit was due to inflation during the year?
- (b) (i) How much was our opening capital eroded by inflation during the year?
 (ii) How well or badly did our disposition of assets and liabilities mitigate that erosion?

We sketch below the outline of a suggested method, using the general framework of CPP accounting, for

achieving these four aims. The method rests also on these two further propositions:

(a) There should only be one set of accounts for each entity, not two: and one profit, not two.

(b) Successive sets of accounts for the same entity should be continuous: stewardship is a continuous process. The opening figures for one set of accounts should accordingly be the closing figures of the previous one.

The only adjustment to the conventional accounts required by our suggestion would be to incorporate the fixed and other non-monetary assets (apart from stock) in the balance sheet at an annual valuation equal to the CPP restated figure at the end of the year. The provisional accounting standard already requires the restated figure to be compared with, and if necessary reduced to, the assets' 'value to the business' (although what that densely opaque phrase may mean as yet remains unrevealed).

The only significant difference with CPP-type calculations that our suggestion would require is the computation of how much inflationary stock profit (if any) had actually been earned, and of how much the inflationary increase (if any) in the profit margin on sales actually was. We fully appreciate that these would be extremely difficult to establish with any precision in many cases; they could be no more

than reasonable approximations at best (just as the CPP results aspire to be). But the fact that a problem is difficult does not, we suggest, excuse us from trying to solve it. It should be clear from the foregoing discussion that no measure of the true effect of inflation on a set of accounts can conceivably be given without these two estimates. To apply the same standard stock adjustment to every profit and loss account in the kingdom where they already reflect the whole spectrum of possible inflationary (and non-inflationary) effects, will be to perpetuate the whole spectrum of those effects in the 'inflation-adjusted' answers; it is like applying the same correcting journal entry to every set of books one meets, when some of them are already right, some are already wrong, and some are partly right and partly wrong. One conclusion at least is inescapable: every business must begin remodelling its internal accounting systems as soon as it can, to segregate the actual inflationary stock profits it does make from the rest of the trading results. It is already vital to know this in many other contexts - e.g. for pricing purposes, or for forecasting profits. It is equally vital to know this if one is going to try to account for inflation in any meaningful way. The desirability of every company going on to the base stock method will not be missed.

The proposed presentation of the results would proceed on these lines:

Shareholders' Funds

Notes

(1)	As last year	XXX
	<i>Add:</i> Restatement by x% to take account of this year's inflation	XXX
		<hr/>
	Last year's funds restated to allow for this year's inflation	XXX
(2)	<i>Deduct:</i> Loss of shareholders' funds due to inflation this year	XXX
(3)	<i>Less:</i> Portion of loss averted by investing in non-monetary assets	XXX
		<hr/>
(4)	Loss (gain) due to holding net monetary assets (liabilities) in a time of inflation	XXX
	<i>Add:</i> Retained profit for the year (see below)	XXX
		<hr/>
(5)	At end of year	XXX
		<hr/>
	Profit and Loss Account	
(6)	Profit for the year excluding the inflationary increment during the year	XXX
(7)	<i>Add (deduct):</i> Estimated effect on profit of inflation during the year:	
	Increase in average margins	XXX
	<i>Less:</i> Increase in depreciation	XXX
		<hr/>
	Total profit for the year including inflationary increment	XXX
	<i>Deduct:</i> Tax	XXX
	Dividends	XXX
		<hr/>
	Retained profit for the year (see above)	XXX
		<hr/>

Notes

- (1) This would be the closing figure of shareholders' funds from the last account, i.e. with non-monetary assets other than stock included at their CPP adjusted written down value at that date.

(2) Contra with second line - i.e. the inflation rate for the year on the total funds in (1).

(3) This would be the sum of two ingredients:

 - (a) The revaluation increment arising during the year from restating the closing non-monetary assets other than stock in year-end pounds (instead of beginning-of-the-year pounds);
 - (b) The stock profit on opening stock, so far as really earned.

(4) As in CPP accounts, this would be the effect of inflation during the year on the opening net monetary items.

(5) Closing capital would thus be the same as in the CPP accounts (but with closing stock at actual cost).

(6) Profit for the year excluding the effect of inflation would be:

 - (a) Profit as in conventional accounts, but after depreciation on opening fixed assets in beginning-of-the-year pounds
 - (b) *Less:* Stock profit on opening stock transferred to (3) (b) above (if earned)
 - (c) *Less:* Average inflation rate on [trading profit before depreciation minus increase in stock], transferred to (7) below - again only if the facts justify this

XXX

XXX

XXX

Profit excluding the inflationary increment during the year

(7)

 - (a) Contra with (6) (c)
 - (b) The increase in depreciation is inflation for the year on the depreciation charge in (6) (a).

After correcting for the fact that the provisional accounting standard does not bring into account the annual write-up of non-monetary assets – a most unfortunate omission³ – our suggested method and CPP accounting both give the same answer for the movement in shareholders' funds for the year. Although the final answer is the same, the figure shown as profit and the presentation of the effects of inflation – that is, quite simply, what is being *said* – would be very different.

A worked example is attached as an Appendix.

³See criticism already made in a contributed article 'Inflation Accounting' in *The Accountant's Magazine*, September 1973, at page 476.

Appendix

Worked example of suggested method of accounting for inflation

The data is taken from the simplified example of CPP accounting given in the article already referred to:

	Year 5		Year 6		Differences		
	Historical pounds	CPP Year 6	Historical pounds	CPP Year 6	Historical pounds	CPP Year 6	Between the two
Fixed assets	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Equity investment	520	629	538	632	18	3	(15)
Stock	10	13	10	13			
Net monetary liabilities	440	466	480	480	40	14	(26)
	(224)	(237)	(219)	(219)	5	18	13
Equity	746	871	809	906	63	35	(28)

WINTER 1974

51

Profit before tax in conventional accounts		205
CPP inflation adjustments:		
Increase in depreciation	(15)	
Removal of stock profits	(26)	
Gain on net monetary liabilities	13	(28)
Inflation adjusted profit before tax		177
Less: Tax (as in conventional accounts)	82	
Dividends (do.)	60	142
Retained CPP profits of year (as in column (vi) above)		35

The suggested presentation is as follows:

Shareholders' Funds

Notes

(1)	As last year	822
	Add: Restatement by 6% to take account of this year's inflation	49
	Last year's funds restated to allow for this year's inflation	871
(2)	Deduct: Loss of shareholders' funds due to inflation this year	49
	Less: Loss averted by investing in non-monetary assets	62
(3)	Gain due to incurring net monetary liabilities in a time of inflation	13
	Add: Retained profit for the year	22
(4)	At end of year	906
	Profit and Loss Account	
(5)	Profit for the year excluding the inflationary increment during the year	162
	Add: Estimated effect on profit of inflation during the year:	
	Increase in average margins	7
(6)	Less: Increase in depreciation	(5)
	Total profit for the year	164
	Deduct: Tax	82
	Dividends	60
	Retained profit for the year	22

Notes

(Detailed workings of the calculations in Year 5 pounds are not given)

(1)	Shareholders' funds at beginning of year:	
	Fixed assets less depreciation in Year	
	5 pounds:	
	Freeholds	110
	Plant and machinery	484
		594
	Equity investment in Year 5 pounds	12
	Stock (historical)	440
	Net monetary liabilities (do.)	(224)
		822

(2) Loss averted by investing in non-monetary assets:

		Closing book value before Year 6 revaluation	Revaluation in Year 6 pounds	Surplus
		108	114	6
	Freeholds, less depreciation			
	Plant and machinery (do.):			
	As in opening balance sheet	484		
	Additions for year	100		
	Total depreciation charged to profits for year	(95)		
		—	489	29
	Equity investment		12	13
				—
				36
	Stock profit (466 — 440) — assumed earned in this case			26
				—
				62
(3)	Gain on net monetary liabilities (237 — 224) =			13
(4)	Shareholders' funds at end of year, 906, as in CPP accounts			—
(5)	Profit for the year analysed thus:			
	Historical profit			205
	Depreciation:			
	On opening assets in Year 5 pounds and additions during year on cost			92
	Less: Historical depreciation			82
				—
	Average inflation rate for year ($\frac{1}{2}$ of 6%) on:			10
	Profit before depreciation	287		
	Less: Increase in stock	40		
		—	247	7
			—	
	Stock profit (466 — 440) — assumed earned in this case			26
				43
	Profit excluding inflationary increment during the year			162
(6)	Increase in depreciation due to inflation during the year:			
	Depreciation in CPP accounts (82 + 15)			97
	Depreciation already charged (Note (5) above)			92
				—
				5
				—

A Note on Stock Dividends

Adrian Buckley

Prior to 6th April 1973 payment of a stock dividend¹ was treated² as a distribution and therefore subject (under S236, ITCA 1970) in the hands of the recipient to income tax. The introduction of the imputation tax system meant (S7, Sch. 22, FA 1972) that stock dividends ceased to be treated, for tax purposes, as distributions.

Under the corporation tax system prior to the imputation system, distributed profits were taxed in three bites, namely first in the hands of the company at the corporation tax rate, then when issued to shareholders as dividends under Schedule F, and thirdly in the hands of shareholders at their personal tax rate less the tax deducted by the company. With a corporation tax rate of 40% and the shareholder paying tax on unearned income at 38·75%, distributed profits would bear tax at a total rate of 63·25%.

The imputation system of corporation tax tends to eliminate this discrimination against distributed profits³ inasmuch as corporation tax is charged on a company's UK profits at 52% and the tax paid to the Inland Revenue on the net cash dividend at the rate of 33/67ths thereof is treated as a payment in advance of the company's mainstream corporation tax liability (being 63·46% of the total UK corporation tax).

The argument for no longer treating a stock dividend as a distribution is clear. If a company has sufficient UK corporation tax to cover the payment of the ACT on dividends then the company bears corporation tax on its profits and effectively suffers no further tax on distributions out of those profits.

Where companies have insufficient mainstream corporation tax against which the ACT on dividends can be offset, the company cannot regard the excess ACT as a payment in advance of total corporation

tax payable. This occurs where the ACT on the dividend exceeds 63·46% of the UK corporation tax (that is the mainstream liability). In such cases the company is effectively paying tax in addition to the corporation tax on its profits. Situations of this sort may arise where companies have high overseas earnings, or large capital allowances carried forward which effectively defer for many years the liability to corporation tax, or offsettable tax losses. Even though unrelieved ACT can be carried forward and is available for set-off against future UK corporation tax it certainly represents, in the short term, a cash outflow from the company to the Inland Revenue.

Where there is little or no mainstream liability against which to obtain relief for advance corporation tax paid, the issue of a stock dividend as an alternative to a cash dividend may be beneficial. This benefit occurs for the company inasmuch as it means that the cash equivalent of the gross dividend, that is the net dividend plus unrelieved advance corporation tax, is retained in the company. The extent that the benefit accrues to the shareholder is a function of his tax position. Assuming the shareholder pays tax at a marginal rate in excess of 50%, then he gains by opting for the stock dividend alternative.⁴ The line of reasoning follows the figuring shown below.

	£
Net cash dividend	67
ACT thereon	33
	<hr/>
Gross equivalent	100
	<hr/>

¹The term stock dividend and scrip dividend are used interchangeably.

²Reference throughout this paper is to the UK corporation tax system.

³To say that it is neutral or indeed to say that it eliminates totally this discrimination is, in my opinion, wrong because of the possibility of unrelieved advance corporation tax.

⁴As a universal decision rule for the shareholder who is offered the option of a stock dividend, this is a simplification. In reality the shareholder's decision is also a function of the price at which the holding was acquired, the price at which it is ultimately sold and the aggregate of disposals in the year in which he realises his investment. If, for example, the shareholder has an unrealised capital loss on a shareholding - which so many shareholders have at the present time - he may be advised to accept the stock dividend even if his marginal rate is well below 50%. Even with a profit on a shareholding, the timing of the ultimate realisation, if the shareholder has capital gains tax losses, may make it advisable to accept the stock dividend option.

Stock dividend	67
Capital gains tax at half marginal income tax rate, i.e., 25%	17
Net proceeds	50

It can be seen that, aside from the question of timing of payment of tax and expenses of realising the shares, the shareholder paying tax at a top rate of exactly 50% will receive the same sum if he opts for a cash dividend or a scrip dividend.⁵ But even though his personal tax rate exceeds 50% he will nonetheless receive 50% of the gross equivalent of the dividend by choosing a stock dividend. Thus the argument is that with a top tax rate above 50%, the shareholder would prefer the stock dividend. Aside from the reasoning set out in footnote 4, it can be shown – using the formula developed in Exhibit 3 – that a shareholder with a marginal tax rate below this level might rationally opt for a stock dividend on the basis of the enhanced present value of shareholding resulting from reinvestment of cash dividend foregone and unrelieved ACT thereon.⁶

The arguments in favour of a stock dividend are relevant mainly to those companies with either small UK earnings relative to dividend, or large capital allowances carried forward, or unrelieved losses, or a large proportion of shareholders with high marginal tax rates. The arguments against the stock dividend revolve around the position of the shareholder who, because of his tax status, has no special incentive to take a stock dividend, for example institutional shareholders, gross fund shareholders, shareholders with low maximum rates of income tax, etc. However, it can be argued that such shareholders do gain by the enhanced benefits accruing to them based on the reinvestment of saved cash dividend and unrelieved

⁵This is also a simplification. As pointed out by E. J. Henbrey in a letter to the *Financial Times* dated 21st September 1974, 'While (the *Financial Times'* comment) that shares received in lieu of dividend have a nil cost may turn out to be correct in substance, in fact share dividends and indeed scrip issues generally, do not have a nil cost for the purposes of capital gains taxation. Ordinary shares received in this manner form part of a pool with the ordinary shares from which they arose and the original cost of the latter is effectively averaged over the original and the newly issued shares'.

⁶The argument that a shareholder with a substantially lower tax rate than 50% – say his top rate is 33% – may sensibly opt for a stock dividend because he views the share price as fundamentally cheap is often used. But, of course, such a shareholder could equally well buy further shares in the stock market. The only saving to him (bar that referred to in footnote 4) by choosing the stock dividend would be in terms of share transaction costs and possibly he might be taking his stock dividend at a price (usually based on the average middle market quotation, less the dividend, for the five business days succeeding the declaration of the dividend) slightly below the 'buy' price in the market.

ACCOUNTING AND BUSINESS RESEARCH

ACT thereon, which can be computed via the formula in Exhibit 3. Shareholders who have no incentive to choose the stock dividend also refer to the fact that they have to put up with short term dilution in earnings per share on their investment. Arguments to this effect can also be countered assuming the company earns sufficient on resources that would otherwise have been paid out as cash dividend and unrelieved ACT thereon. Exhibit 1 derives a formula to show the extent of short term earnings per share dilution. Exhibit 2 shows an expression to determine the rate of return that a company must earn on resources kept in the company by virtue of its offering the alternative of a stock dividend if dilution is to be made good.

The companies that have chosen to offer their shareholders the option of a stock dividend have been motivated by the reasons mentioned above, for example RTZ (whose dividend is not covered by UK profits), Trafalgar House (whose substantial tax benefits following the Cunard acquisition mean protracted unrelieved ACT), J. Sainsbury (with its substantial family shareholders with high marginal tax rates). Other large companies to have given shareholders the alternative of a stock dividend include Gestetner, Guthrie, Group Lotus, Mercury Securities, Marley and many others.

Practical Points

In practical terms it is essential to ensure that a company's Articles of Association allow a stock dividend to be offered; also a scrip dividend should not result in holders of convertible loan stock being given a disproportionately advantageous position upon conversion simply because of a quirk in the wording of the loan stock trust deed. In either case this may mean that resolutions have to be passed changing the wording of the relevant documents.

Also important in an environment of dividend control is the question of the Treasury's view in connection with stock dividends. Originally the Treasury decided to restrict the annual dividend growth to a company's capital exclusive of any capital issues made in lieu of dividend. Thus, assuming an allowed 12½% growth in dividend, this meant that in a year following a stock dividend the overall increase in dividend per share would be less than 12½% depending upon the proportion of elections for the scrip dividend that had been made. Their ruling has now changed and the dividend growth allowable is not restricted in this way.

It should also be pointed out that for a company to retain trustee status a cash dividend must be paid every year. Thus it is usual for companies to offer the stock dividend alternative on all shares, but

where the offer is accepted a small nominal cash dividend would also have to be paid - thus a cash dividend would be paid on all shares for all accounting years. Where a company declares an interim and a final dividend and the shareholder opts for a stock dividend on both occasions the nominal cash dividend need only be paid on one of the dividends.

To the large company the view of institutional shareholders is important. The Investment Protection Committee of the National Association of Pension Funds has expressed the following general views. 'Gross funds will not find any particular advantage in exercising such an option (i.e., the scrip dividend option), and the Committee feels that it is the individual shareholder with a heavy liability to income tax, who will receive the maximum benefit from an option to take scrip. For the company, cash retentions may be of assistance. However, the Committee would query whether the administrative costs involved in offering such an option, including those caused by the desirability of the payment of a small dividend to all shareholders to retain trustee status, are justified when only a minority of shareholders in a company are likely to exercise this option, and yet the cost of the operation is borne by all investors in a company.' The Investment Protection Committee's statement goes on to say that the 'Committee has recommended that any option involving the creation of accumulating⁷ or capital shares should be opposed. After careful consideration it is felt that there is no benefit (rather the reverse)

⁷It was this type of scrip dividend that RTZ offered to shareholders in lieu of dividend. In the wake of the IPC's objection this practice has only been followed, at the time of writing, by one quoted company. RTZ's offer of this type of stock dividend was given prior to the IPC's announcement.

in creating a multiplicity of shares which will unnecessarily complicate the capital structure of a company and create unnecessary difficulties when dealing in such classes of shares. Shareholders' approval for a scrip option in lieu of cash dividends should be required annually'. The institution's objections are understandable. The creation of an accumulating class of shares which does not require annual sanction for a stock dividend could mean that stock dividends continued to be offered when there was no advantage to company or shareholder by so doing (due to the company's changed tax status and/or shareholder profile).

Of course the issue of a scrip dividend at historically low share prices or prices which are expected to be seen to be low is also less advantageous to the institutional shareholder because such institutional shareholders are, in view of their tax position, less likely to take advantage of the offer than the high marginal tax rate shareholder. Such 'cheap' offers result in proportionately greater dilution in earnings per share than if made at a higher subscription price.

Dilution in Earnings per Share

How much dilution in earnings per share results from a stock dividend? Immediate dilution can easily be calculated by reference to the formula:

$$\text{Dilution} = 1 - \frac{N}{(N + \Delta N)}$$

where N is the number of shares issued before shareholders have been offered the scrip dividend option, and ΔN the number of new shares created by acceptance of such an offer. The derivation of the above formula - which refers only to very short term dilution - can be seen in Exhibit I.

EXHIBIT I

Formula for Short Term Earnings per Share Dilution following Scrip Dividend

$$\text{Dilution} = \frac{\text{Earnings per share before scrip} - \text{Earnings per share after scrip}}{\text{Earnings per share before scrip}}$$

Where E_0 is the last reported earnings available for ordinary shareholders; N is the number of ordinary shares issued before the scrip and ΔN is the number of new shares created by the acceptance of the scrip dividend option.

$$\begin{aligned} \text{Dilution} &= \left[\frac{E_0}{N} - \frac{E_0}{(N + \Delta N)} \right] \frac{N}{E_0} \\ &= 1 - \frac{N}{N + \Delta N} \end{aligned} \quad (1)$$

This formula refers only to short term dilution inasmuch as E_0 refers to earnings available for ordinary shareholders as last reported.

The formula in Exhibit 1 refers to very short term dilution in earnings per share. A not dissimilar equation can be derived to show the extent of future earnings dilution consequent upon a proportion of shareholders choosing their dividend in scrip; such a formula is shown in Exhibit 2. Formula (2) in the exhibit refers to the situation where the company has totally unrelieved ACT up to year n, the year for which earnings per share is projected. Formula (4) in Exhibit 2 shows the extent of dilution where the company offering the stock dividend does not

have unrelieved ACT but decides to give shareholders the option of a stock dividend because it has a large proportion of shareholders with high marginal tax rates. Also Exhibit 2 shows an expression for the rate of return to be earned on resources kept in the company in order to eliminate earnings per share dilution. It can be seen from formula (3) in Exhibit 2 that where the company has unrelieved ACT as far ahead as can be foreseen, the rate of return necessary is equal to $\frac{67}{100}$ ths of the ratio of the projected earnings per share (assuming no stock

EXHIBIT 2

Rate of Return Necessary to Eliminate Earnings Dilution

(a) ACT unrelieved as far ahead as can be foreseen

$$\text{Dilution} = \frac{\text{Projected eps. in year } n \text{ without scrip} - \text{Projected eps. in year } n \text{ with scrip}}{\text{Projected eps. in year } n \text{ without scrip}}$$

Where E_n is the projected earnings available for ordinary shareholders in year n without a scrip dividend; D_0 is the present net dividend on ordinary shares declared based on number of shares in issue, N, times net dividend declared per share; x is the proportion of ordinary shares for which a stock dividend is chosen; r is the rate of return net of tax earned by the company on resources kept in the company (resultant upon the choice of a stock dividend) that would otherwise have been paid out. Other notation is as per previous exhibit.

$$\begin{aligned} \text{Dilution} &= \left[\frac{E_n}{N} - \frac{E_n + \frac{100}{67} D_0 x r}{N + \Delta N} \right] \frac{N}{E_n} \\ &= I - \frac{N (1 + \frac{100}{67} \frac{D_n}{E_n} x r)}{N + \Delta N} \end{aligned} \quad (2)$$

The above formula refers to the situation where we are dealing with totally unrelieved ACT without the possibility of it being set against mainstream corporation tax by year n. It should be noted that this model ignores costs of administering the stock dividend option available to shareholders.

For dilution to be nil, the value of r can be found from the above expression

$$r = \frac{\Delta N}{N} \times \frac{67}{100} \times \frac{E_n}{D_0 x}$$

It should be noted in the above expressions that

$$\Delta N = \frac{D_0 x}{P}$$

where P is the price at which one share can be bought from a shareholder's stock dividend rights. Thus, substituting for ΔN

$$r = \frac{67}{100} \times \frac{E_n}{NP} \quad (3)$$

(b) ACT not unrelieved

In this case the above formulae must be adapted to allow for the fact that (beyond a few months) the company only has available for reinvestment the amount of the dividend in respect of which the shareholder opts for the stock dividend. Thus

$$\text{Dilution} = I - \frac{N (1 + \frac{D_n}{E_n} x r)}{N + \Delta N} \quad (4)$$

and the value of r to reduce dilution to nil is given by:

$$r = \frac{E_n}{NP} \quad (5)$$

dividend) to the present price per share.⁸ In a similar manner, formula (5) in Exhibit 2 shows that where the company does not have an unrelieved ACT position, the rate necessary is equal to the ratio of the projected earnings per share (assuming no stock dividend) to the present price per share.^{9,10}

It has been shown earlier that the high marginal tax rate shareholder stands to gain most by electing to take a stock dividend. But the position of the shareholder who takes the cash dividend can be shown to be enhanced by virtue of his improved future income stream based on the reinvestment of funds kept in the business resultant upon some shareholders taking the stock dividend. These funds kept in the business arise from two sources, namely:

- cash dividend foregone by some shareholders.
- ACT thereon.

Assume that x represents the proportion of shares upon which a stock dividend is chosen and D represents the amount of the net dividend declared by the company. If the company has unrelieved ACT as far ahead as can be seen - for example because of overseas earnings - then the gain accruing to the shareholder will be based on the earnings that the company can achieve on investment of $\text{£} \frac{1}{87} xD$. Exhibit 3 shows, in terms of discounted future dividend expectations, the respective positions of the shareholder who *does not take* a stock dividend assuming:

- first, that no such stock dividend option is offered.
- second, that a stock dividend alternative is offered and accepted by some shareholders.

In the former case the present value per share of future dividends is given by the following expression (notation explained in the body of Exhibit 3):

$$\frac{D(i+g)}{(k-g)} \times \frac{i}{N}$$

If some shareholders opt for the offer of a stock dividend, the position of the shareholder not so choosing, in terms of present value per share based on future dividend expectation, is given by the expression:

⁸That is, $\frac{17}{100}$ ths of the projected earnings yield.

⁹That is, the projected earnings yield.

¹⁰It should be pointed out that the formulations in the Exhibits disregard the ACT surcharge, perhaps one of the most illogical of corporate taxation levies ever devised especially when companies are confronted with widespread liquidity problems.

$$\left[\frac{D(i+g)}{(k-g)} + \frac{\left(i \frac{1}{87} xD \right) (i-p)}{(k-pi)} \right] \frac{i}{N + \frac{xD}{p}}$$

(Notation as made explicit in Exhibit 3)

Thus for the shareholder who does not opt for the stock dividend to be indifferent, i (the return the company earns on reinvested money) must be sufficiently¹¹ large to equate the above expressions. Thus, if:

(Present value with no stock dividend) $\Delta N =$
(Present value addition) N

then, as indicated in Exhibit 3:

$$\frac{D(i+g)}{(k-g)} \times \frac{xD}{P} = \frac{\left(i \frac{1}{87} xD \right) (i-p) N}{(k-pi)}$$

$$\text{or, } \frac{D(i+g)}{NP(k-g)} = \frac{\left(i \frac{1}{87} xD \right) (i-p)}{(k-pi)} \quad (6)$$

But it will be recalled that this expression refers only to the situation where the company has unrelieved ACT as far ahead as can be seen.

If, by contrast, it is hypothesised that the company has unrelieved ACT for only a limited period (to year m , say), then we must adapt the expressions in Exhibit 3. This is because the gain accruing to shareholders will be based on the earnings that the company can achieve on investment of xD (the amount of stock dividend chosen) to infinity plus the gain from reinvestment of ACT thereon - but the major part of this accrues prior to ACT becoming relieved in year m . Exhibit 4 shows how it is necessary to adopt the projections in the previous exhibit.

In this case the value of i must be sufficiently large to equate the expressions:

$$\begin{aligned} & \frac{D(i+g)}{(k-g)} \times \frac{xD}{P} \\ &= \left[\frac{\left(i \frac{1}{87} xD \right) (i-p)}{(k-pi)} - \frac{\left(i \frac{33}{67} xD \right) (i-p)}{(k-pi)(i+k)^m} \right] N \\ & \text{or, } \frac{D(i+g)}{NP(k-g)} = \frac{(i-p)i}{(k-pi)} \left[\frac{100}{67} - \frac{33}{67(i+k)^m} \right] \quad (7) \end{aligned}$$

In order to show the application of formula (6) and formula (7) in the respective situations of a company with unrelieved ACT as far ahead as can be seen and ACT unrelieved for, say, three years, two numerical examples follow. Assume that a company's dividend yield is 7%, the dividend is expected to grow at 10% compound, the share-

¹¹If formula (6) or (7) is used in a practical context to determine the minimum value of i , then equation (6) or (7) is most easily solved by trial and error. It should be noted that $\frac{D}{NP}$ in formulae (6) and (7) represents the company's dividend yield.

EXHIBIT 3
Future Dividend Expectations of Shareholder Choosing Cash Dividend in Year O (ACT totally Unrelieved)
Total net dividend
If no stock dividend now
in year

1	$D(I + g)$	$D(I + g) + (I \frac{10\%}{100} xD)(I - p)$
2	$D(I + g)^2$	$D(I + g)^2 + (I \frac{10\%}{100} xD)(I - p)(I + pi)$
3	$D(I + g)^3$	$D(I + g)^3 + (I \frac{10\%}{100} xD)(I - p)(I + pi)^2$
n	$D(I + g)^n$	$D(I + g)^n + (I \frac{10\%}{100} xD)(I - p)(I + pi)^{n-1}$

As n tends to infinity,
then present value =

$$\frac{D(I + g)}{(k - g)}$$

Share base =

$$N$$

$$N + \Delta N \quad i.e., N + \frac{xD}{P}$$

For shareholder who takes cash dividend in year O to be indifferent between options:

$$\frac{\text{Present value with no stock dividend}}{N} = \frac{\text{Present value with no stock dividend} + \text{Present value addition}}{N + \Delta N}$$

i.e. (Present value with no stock dividend) ΔN = (Present value addition) N

Notation D = Total net dividend declared by company in year O.

g = Expected growth in dividend if no stock dividend.

k = Discount rate applied by shareholders to income from the risk class of the company.

p = percentage ploughback.

Other notation as per earlier exhibits.

Note: This model assumes a constant ploughback ratio and the company has unrelieved ACT as far ahead as can be foreseen.

*The first part of this expression is the dividend as it would have been without the stock dividend option. The second part is the enhanced dividend due to the return earned on reinvestment of dividends foregone and unrelieved ACT thereon. Growth in this latter part of the expression is at the rate of the proportion ploughed back times the return earned.

holder's required return is 15% and the company has a ploughback ratio of 50%. Using the trial and error method to find the value of i in the situation of a company with unrelieved ACT as far ahead as can be seen, we have, applying formula (6):

Trying $i = 14\%$

$$\begin{aligned} \text{LHS of formula (6)} &= \frac{0.07 \times 1.1}{0.05} \\ &= 1.54 \\ \text{RHS of formula (6)} &= \frac{0.14 \times \frac{100}{67} \times 0.50}{0.15 - 0.07} \\ &= 1.31 \end{aligned}$$

Trying $i = 16\%$

$$\begin{aligned} \text{RHS of formula (6)} &= \frac{0.16 \times \frac{100}{67} \times 0.50}{0.15 - 0.08} \\ &= 1.71 \end{aligned}$$

By linear interpolation $i = 15\%$.

Using a similar approach in respect of a company with ACT unrelieved for three years, applying formula (7) we have:

Trying $i = 16\%$

$$\begin{aligned} \text{LHS of formula (7)} &= \frac{0.07 \times 1.1}{0.05} \\ &= 1.54 \\ \text{RHS of formula (7)} &= \frac{0.50 \times 0.16}{0.15 - 0.08} \\ &\quad \left[\frac{100}{67} - \frac{33}{67} \times \frac{1}{1.5209} \right] \\ &= 1.1429 \times 1.1713 \\ &= 1.305 \end{aligned}$$

Trying $i = 18\%$

$$\begin{aligned} \text{RHS of formula (7)} &= \frac{0.50 \times 0.18}{0.15 - 0.09} \\ &\quad \left[\frac{100}{67} - \frac{33}{67} \times \frac{1}{1.5209} \right] \\ &= 1.5 \times 1.1713 \\ &= 1.758 \end{aligned}$$

By linear interpolation $i = 17.04\%$.

The Position of the Shareholder

With the above notation it can be seen that the high marginal tax-rate shareholder who opts for a stock dividend foregoes, in terms of cash dividend, the sum of

$$D \times \frac{M}{N} \times \frac{100}{67} \times (I - t)$$

where M is the number of shares he holds and t is his marginal tax rate. The net capital gain that

would accrue to him if he sold the shares taken in lieu of dividend would amount to:

$$\frac{D}{N} \times M \times 70\%$$

In addition, on the shares that he retains he will theoretically have an enhanced present value (assuming ACT is unrelieved as far ahead as can possibly be seen) amounting to:

$$\frac{M}{N} \frac{(I - \frac{100}{67} \times D)(I - p)}{(k - pi)} \times \frac{100}{67} \times (I - t)$$

Conclusions

Offering the option of stock dividends to shareholders can be highly advantageous to companies with protracted unrelieved ACT problems. Taking up the offer of a stock dividend can be particularly advantageous to shareholders with high marginal tax rates. But even to the shareholder who does not exercise his rights to a stock dividend, because of his particular tax status, the stock dividend can create benefit if the company can earn sufficient on funds kept in the business that would otherwise have been paid out.

In terms of deciding whether to offer a scrip dividend, there are a number of practical points that companies should look at including the company's own tax position, the apparent tax position of its ordinary shareholders and the possible acceptance rates based thereon, the maintenance of a company's trustee status, possible necessary changes to wording of loan stock trust deeds, and/or Articles of Association, and the views of Investment Protection Committees of institutional shareholders.

From the quantitative standpoint, the extent of short term earnings per share dilution can be calculated by reference to equation (1) in this paper. Longer term earnings per share dilution is quantified in equations (2) and (3) and the return that a company must earn on resources to overcome such dilution is set out in equations (4) and (5). Also, if the alternative of a stock dividend is not to leave the shareholder who does not opt for it worse off in terms of present value of future dividend flows, then the return on invested funds must be sufficient to satisfy the expression in equation (6), or equation (7) – whichever is the relevant one. Obviously if management is to offer the stock dividend option, it should ensure that these criteria are met. Failure to meet these requirements at the same time as offering the alternative of a stock dividend clearly means that some shareholders are being short changed.

EXHIBIT 4
Future Dividend Expectations of Shareholder choosing Cash Dividend in Year O (ACT Unrelieved until Year m)

Total net dividend

If no stock dividend now

With stock dividend now

1	$D(I + g)$	$D(I + g) + (I \frac{1}{g} xD)(I - p)$
2	$D(I + g)^2$	$D(I + g)^2 + (I \frac{1}{g} xD)(I - p)(I + p)$
3	$D(I + g)^3$	$D(I + g)^3 + (I \frac{1}{g} xD)(I - p)(I + p)^2$
m	$D(I + g)^m$	$D(I + g)^m + (I \frac{1}{g} xD)(I - p)(I + p)^{m-1}$
m + 1	$D(I + g)^{m+1}$	$D(I + g)^{m+1} + (I \frac{1}{g} xD)(I - p)(I + p)^m - (I \frac{1}{g} xD)(I - p)$
m + 2	$D(I + g)^{m+2}$	$D(I + g)^{m+2} + (I \frac{1}{g} xD)(I - p)(I + p)^{m+1} - (I \frac{1}{g} xD)(I - p)(I + p)$
n	$D(I + g)^n$	$D(I + g)^n + (I \frac{1}{g} xD)(I - p)(I + p)^{n-1} - (I \frac{1}{g} xD)(I - p)(I + p)^n$

As n tends to infinity,
then present value

$$\frac{D(I + g)}{(k - g)} + \frac{(I \frac{1}{g} xD)(I - p)}{(k - p)} - \frac{(I \frac{1}{g} xD)(I - p)}{(k - p)(I + k)^m}$$

Share base

$$N + \Delta N = i.e. N + \frac{xD}{P}$$

For shareholder who takes cash dividend in year O to be indifferent between options:
 Present value with no stock dividend Present value with no stock dividend + Present value addition

$$\frac{N}{N + \Delta N} = \frac{N}{N + \Delta N}$$

i.e. (Present value with no stock dividend) ΔN = (Present value addition) N
 Notation m = Year in which ACT is expected to be relieved.
 Other notation as per earlier exhibits.

The Informational Value of Replacement Cost Accounting for External Company Reports

Boris Popoff

The writing of this paper has been partly stimulated by S. J. Gray's and M. C. Wells' article 'Asset Values and ex post Income' (*Accounting and Business Research*, Summer 1973), a critique of this article presented by Professor G. Whittington 'Asset Valuation, Income Measurement and Accounting Income' (*Accounting and Business Research*, Spring 1974), and further comment by Graeme Macdonald - 'Deprival Value: Its Use and Abuse' (*Accounting and Business Research*, Autumn 1974). In their article Gray and Wells took issue with Parker's and Harcourt's argument for a concept of income using both end of period exit and entry prices.¹ They claimed to have shown the irrelevance of replacement cost to the purposes of income calculation as implied by Parker and Harcourt (namely forecasting the future, planning and control and stewardship), and concluded that:

'Whatever the difficulties in practical application, the proposal to use NRVs (net realisable values) is worth pursuing because it is the only "value" relevant to all the presumed purposes of ex post income calculation'.²

Professor Whittington's paper began as a critique of Gray's and Wells' article but its main purpose, according to Professor Whittington, was to question the practice and theory of periodic income measurement. He pointed out that when all the relevant values are available to the decision-maker (present value - PV; replacement cost - RC; net realisable value - NRV) income measurement is redundant -

'... decisions will be a matter of disposing the resources of the entity in a manner which maximises its Present Value, which represents the discounted value of future net receipts from

holding, buying or selling assets'.³

Recognising, however, that we do not live in a certain world and that it is impossible, therefore, to provide precise details of the future cash flows which will accrue to a particular enterprise or particular assets, Professor Whittington examined the possibility of finding surrogates for present value such as RC and NRV. He apparently found these unsatisfactory. He suggested that '... financial reports should provide information relevant to the assessment of the various valuations of assets in their alternative uses, including the discounted Present Values of future cash flows arising from some uses. Research should be directed towards discovering which forms of reporting will best satisfy this information requirement, rather than to the pursuit of a single "ideal" measure of periodic income'.⁴

Regarding income measurement, Professor Whittington stated that while there may be a role for ex post income measurement if it provided a guide to future prospects, he had found little evidence that this might in fact be the case.

In his comments on Gray's and Wells' article, Graeme Macdonald proposed income measurement on the basis of 'deprival' value, and asset valuation for balance sheet purposes on the basis of net realisable value. According to Macdonald the use of deprival value (which normally would consist largely of replacement cost) for balance sheet purposes is an abuse of the concept.⁵

It is the opinion of this writer that attempts to provide, in external accounting reports, 'information relevant to the assessment of the valuation of assets in their alternative uses including discounted Present Values' as suggested by Professor Whittington will

¹H. Parker and G. C. Harcourt, 'Readings in the Concept and Measurement of Income' (Cambridge, Cambridge University Press, 1969).

²S. J. Gray and M. C. Wells, 'Asset Values and ex post Income', op. cit.

³G. Whittington, 'Asset Valuation, Income Measurement and Accounting Income', op. cit.

⁴Ibid.

⁵Graeme Macdonald, 'Deprival Value: Its Use and Abuse', op. cit.

be as fruitless as attempts to find a single 'ideal' measure of periodic income. The difficulties mentioned by Professor Whittington in providing information for the effective forecasting of future cash flows alone preclude the effective use of present value in external accounting reports. Quite apart from the problems of practical application, attempts to provide information for the assessment of alternative asset values, e.g., present value, replacement cost and net realisable value (in some cases the disclosure of historic cost may be relevant), are likely to increase the confusion regarding the objectives of accounting reports and the manner in which these objectives can be attained. It is the opinion of this writer that accounting reports should be purposeful — their objectives should be defined. While a definition of objectives may restrict the field to be covered by the report, it is the belief of the writer that such a restriction will place the attainment of these objectives within the scope of practicality.

It is the opinion of this writer that the practical solution to the problem of providing relevant information to users of financial reports is likely to be found in a compromise which, from practical necessity, is unlikely to be entirely satisfactory from a purely conceptual point of view. It is also the opinion of the writer that this compromise solution lies to a very great extent in the measurement of *ex post* income on the basis of replacement cost.

Before we proceed to examine the informational value of replacement cost for external accounting reports, which is the objective of this paper, the assumptions upon which the ensuing discussion will be based will be spelled out. These assumptions are:

- (1) The objective of business enterprises is the utilisation of economic resources for the purpose of producing a flow of economic benefits.
- (2) The function of accounting is to record, analyse and report information about the economic results of operations and economic position of business entities.⁶
- (3) The function of external accounting reports is to provide information for the making of economic decisions by parties who rely on such reports as a

⁶In a paper entitled 'Postulates, Principles and Rules' (*Accounting and Business Research*, Summer 1972), the author proposed an approach to the development of an overall framework of accounting theory based on internally consistent postulates and principles. The basic function of accounting was postulated to be that of recording, analysing, interpreting and reporting information about the economic results and financial positions of entities. The ensuing discussion is consistent with the proposals made in that paper.

ACCOUNTING AND BUSINESS RESEARCH

basic source of information.⁷

It is also proposed that in order to serve adequately the function of external accounting reports as postulated under (3), the information disclosed in the reports should meet the following criteria:

- (1) The accounting reports should provide an effective measure of the economic viability of current operations as a starting point in any attempt to predict the future by users of the reports. To achieve this objective the accounts should disclose the effective economic surpluses generated by operations in terms of the *status quo*. The concern with the *status quo* is emphasised as the future is uncertain and any forecasts built into the main body of the accounts (the operating statement and the balance sheet) are likely to be subject to varying degrees of error, bias or even dishonesty on the part of the providers of the forecast.
 - (2) The reports should reflect, in effective economic terms, the economic resources of the firm at balance date — being the economic resources bequeathed to the new period.
 - (3) The accounts should provide an effective measure of managerial performance. While the normal internal method of controlling performance is by means of forecasts and target setting and comparisons of actual results with the forecast or the target, this method is unsuitable for external accounting reports. For one thing, the forecast or the target will be set by the persons whose responsibility it will be to achieve the forecast or target. The standards of comparison and evaluation should be external — in relation to the performance of other enterprises in the same industry or trade, or the performance of business enterprises in general. While this measures relative efficiency only (for example, in an industry which on the whole may be inefficient); it does not lack incentive for or deny opportunity to the pace-setting firm.
 - (4) The method of measuring of and reporting on performance should be capable of objective application. This means, for one thing, that present value should be excluded from the external reporting system either as a direct basis of valuation or as a means of selecting bases of valuation other than present value such as historic cost, replacement cost, or net realisable value.⁸
- The arguments in both Gray's and Wells' and Professor Whittington's papers seem to be based on the assumption of a narrow proprietary concept of the
-
- ⁷A similar objective of external accounting reports was stated in the report of the Trueblood Study Group on the Objectives of Financial Statements — AICPA, 'Objectives of Financial Statements', October 1973, p. 17.

business enterprise with an assumed identity of managerial and shareholders' objectives and an ability on the part of shareholders to influence directly the decisions of management. There appears to be a disregard for the complex social and economic environment within which business enterprises are currently operating, as well as the strong interests of groups other than shareholders or investors in the performance of business enterprises. It is the belief of the author that business enterprises can no longer pretend to operate in an assumed isolation from the socio-economic environment regardless of whether or not they are incorporated enterprises. Further, in the case of the widely held large corporation, the proprietary characteristics of the shareholders' equity have been greatly watered down - at least for as long as a crisis situation such as a takeover bid or an impending liquidation does not arise. The matter is further complicated by the ability of incorporated enterprises to operate on a very wide scale both nationally and internationally and to affect, to a very large degree, a society which is strongly motivated by economic considerations.

For these reasons, while external accounting reports are still primarily addressed to shareholders, a clear recognition must be made of the interests in the reports of other parties such as trade unions, consumers, the government as a collector of taxes and a regulator of the economy, and others.

While at first sight the provision of information to meet the needs of such diverse and often conflicting interests may seem a hopeless task, it is the belief of the author that, as these interests are essentially economic, it is possible to find a meaningful way of measuring and reporting on operating performance which could largely satisfy the four criteria enumerated earlier and which, being largely neutral as among the parties concerned, would go a long way towards meeting the informational needs of the parties. It is also the belief of the author that the measurement of *ex post* income on the basis of replacement cost would go a long way towards achieving this aim.

Valuation Bases which reflect Current Economic Value

Reporting on the economic results of operations and economic position of business enterprises requires the evaluation of operating results and financial position in current economic terms within the context of the four criteria set out earlier.

Current economic value may be determined on a 'subjective' basis, such as present value, or on an objective basis - based on some reference to current market prices, such as net realisable value or current replacement cost. Discussions on 'value' have usually implied the corollary 'value to the firm'. Our search for an objective basis for determining the economic viability of current operations and the economic surpluses generated by operations, while essentially based on the concept of value to the firm, would lead us to go, in our choice of a valuation basis, somewhat beyond this concept.

Historic Cost and Current Economic Value

In times of changing prices historic cost must be rejected as a basis for determining current economic value. While historic cost may have its place in reporting on stewardship in a very narrow sense - e.g., on a charge and discharge basis - our postulate of the objective of business activity as being one of the use of economic resources for the purpose of producing a flow of economic benefits requires us to become concerned with economic values as reflected in current prices rather than historic costs.

However, there is at least one case where it may be argued that historic cost represents current economic value to the firm. Such a case arises where the firm is subject to price control applied on the basis of historic cost. Because prices are based on historic cost and because the firm can recover for tax purposes only its historic cost, it can be argued that the non-monetary assets of the firm are only worth to the firm their historic cost - e.g., for all practical purposes they represent quasi monetary assets valued at historic cost.⁸ The implications of such a situation will be discussed later in this paper.

Finally, for the reasons for which we rejected historic cost as a relevant basis of valuation in times of changing prices, we would most likely reject historic cost which has been adjusted for changes in the general level of prices as a relevant basis of valuation. As what we are concerned with are move-

⁸It is acknowledged that there are cases where present value may be used for valuation purposes with a considerable degree of objectivity, for example government and local body stocks and bonds, or where contractual arrangements attach a high degree of certainty to receipts and payments and the timing of the same. In the majority of cases, however, present values are highly subjective and are, therefore, unsuitable for valuation purposes at least as far as external company reports are concerned. For one thing it will be impossible to say whether in fact they are genuine expectations.

⁹See, for example, R. C. Jones, 'Price Level Changes and Financial Statements: Case Studies of Four Companies' (American Accounting Association, 1955), in particular the case of the New York Telephone Company, p. 14.

ments in the prices of specific commodities, a general price level restatement of historic costs need not necessarily reflect current values.

Present Value

The inherent subjectivity of present value has already led us to reject it as a basis of valuation for external reporting purposes. Present value also lacks objectivity within the context of our criterion 3 - that the accounts should provide an effective measure of managerial performance. In this respect present value lacks objectivity in the sense that it is based on the expected use to be made of the assets. This would mean that the same asset would be valued differently by different users. Efficient management would place a higher value on the asset than inefficient management; yet to the extent that accounting data are used to evaluate relative managerial performance, the asset should be valued at the same figure in both cases so that actual results will reflect the comparative effectiveness of the use made of the asset.

Net Realisable Value (or current cash equivalent)

Current realisable value (or current cash equivalent) was proposed by Chambers as a single measurement concept for all assets, being:

'... a single financial property which is universally relevant at a point of time for all possible future actions in markets...'¹⁰

Chambers was also concerned with the additivity of the figures in financial reports:

'Selling and acquisition prices cannot be added to obtain an aggregate which has a sensible meaning ... identity in meaning is implied by the description "presently realisable sum if sold"'¹¹

Net realisable value (or current cash equivalent) is the valuation concept favoured by Gray and Wells as:

'... the only value relevant to all the presumed purposes of *ex post* income calculation'.¹²

Like Chambers, Gray and Wells argue for reporting on the capacity of the firm to adapt when they say that

'A more useful value would be one that provides an indication of the means available, for the means currently available plus those expected in the future, determine the course of action which it is feasible for a firm or an individual to follow, and

ACCOUNTING AND BUSINESS RESEARCH

in respect of which it is therefore worthwhile forecasting the future'.¹³

It is the opinion of the author that net realisable value is not acceptable as a single measurement concept for all assets for a number of reasons.

To report in terms of net realisable value of assets as a determinant of the 'course of action it is feasible to follow' assumes that management is continuously reviewing the possibility of selling the assets of the firm and is evaluating all the possible alternative courses of action which may arise as a result of such a sale. It is the opinion of the author that such an assumption does not conform with observable reality. Firms do not normally switch over from one kind of business activity to another by liquidating one type of, say, capital assets in order to acquire another type of capital assets. Rather they tend to stay in a particular industry or to diversify through expansion into new areas by investing operating surpluses or through borrowing, or additional capital subscriptions. It is the opinion of the author that a more useful indication of the 'course of action it is feasible to follow' will be given by a measure of the economic surpluses generated by current operations. The amount of these economic surpluses provides a measure of the viability of current operations in the long term and the resources generated by current operations to be used, possibly, in the expansion of operations or in distribution to, say, shareholders.

Even if management were considering the sale of certain specific assets held and were evaluating the alternative courses of action which could arise from such a sale, reporting all assets in terms of net realisable value is not likely to be very meaningful even to management - much less to those 'outsiders' dependent on the report as a basic source of information. So far as management is concerned, the alternatives open to management regarding the sale of assets would range from one of holding on to all of the assets, to selling only some of the assets, to selling all of the assets. The valuation of all assets on the basis of realisable value would imply that the only course of action being contemplated by management is the more or less immediate realisation of assets. It is the opinion of the author that where no realisation of assets is contemplated (and this is likely to be the predominant state of affairs with firms) reporting in terms of net realisable value would amount to reporting on an irrelevant course of action. Further, reporting in terms of net realisable value for the purpose of showing the means available for all possible future actions is not likely to be very meaningful as the number of all possible future

¹⁰R. J. Chambers, 'Accounting, Evaluation and Economic Behaviour', Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1966, p. 92.

¹¹Ibid., p. 93.

¹²S. J. Gray and M. C. Wells, op. cit.

¹³Ibid.

alternative actions is likely to be infinite. It is the author's view that a better way to meet the informational needs of external users of accounting reports is to report on the distributable wealth generated by companies - wealth which is distributable in the form of dividends, higher wages and reasonable prices.

According to Gray and Wells the purpose of a report on stewardship is 'to enable the owner of the property entrusted to the steward to assess the performance of the steward and check on the condition of his property'. They also claim that the current state of the property cannot be assessed by referring to what it would cost to replace. In the belief that the property originally delivered to the steward represented a stock of purchasing power, they would like to see a statement as to the stock of purchasing power now in the possession of the steward.

It is the opinion of the author that, in order to be effective, a report on the performance of a steward and the state of the property under his control should fairly reflect the purpose of the business activity carried out by the steward - e.g., the purpose for which the property was originally delivered to the steward or for which surpluses generated by operations were applied by the steward. There are instances where accounting for a stock of purchasing power (in terms of the current realisable value of assets) will make good sense both as a report on stewardship and on the state of the property in the possession of the steward - when, for example, the objective of the business activity is the maximisation of the realisable value of assets as in the case of property speculation or speculative investment in marketable securities.

There are many other instances, however, (including probably the majority of cases) where reporting in terms of current realisable value will not achieve the objectives of responsible reporting on stewardship. This is the case where the investment involves the acquisition of a capacity to provide goods and services for the purpose of earning income by way of sale over and above cost. In such a case the valuation of the assets comprising the operating capacity (many of which may be of a specialised nature) on the basis of realisable value is irrelevant as a report on the performance of the steward or the state of the property under his control. What we should be concerned with in such a case is an objective valuation of the property in current economic terms relating to its production capabilities, and an evaluation of operating results in current economic terms. It is claimed that in such a case valuation on the basis of current replacement cost is

more valid than valuation based on current realisable value.

We can also consider the question of the additivity of the monetary amounts included in a set of accounting reports. According to Chambers, selling and acquisition prices cannot be added together to obtain an aggregate which has a sensible meaning. As one brings this line of reasoning to its logical conclusion, cash has to be added to cash - hence the need for current cash equivalents based on current selling prices.

In the opinion of the author, a business situation in which the objective of the investment is the maximisation of the realisable value of the asset itself as in property speculation or speculative investments on the stock market is *qualitatively different* from a situation where the objective of the investment and ensuing business activity is the acquisition of capacity for the purpose of providing goods and services in order to earn income by way of sale above cost. It appears, to this writer at least, that to apply the same valuation basis, such as current realisable value, to two such qualitatively different situations as these is at least as illogical as adding selling and acquisition prices in the same set of accounts.

Macdonald argued that Balance Sheet valuation at net realisable value indicates the ability of the firm to raise additional capital by way of borrowing and, therefore, provides investors with information regarding the prospects of the firm for optimising its future income in the light of new opportunities.¹⁴ Macdonald claimed that

'At best all that a financial position statement with assets stated at deprival value tells us is what it would cost another company in resources to have the same opportunity of generating a similar level of income through similar productive processes'.¹⁵

It is the opinion of the author that there is value in providing information to investors regarding the ability of a firm to borrow. This is hardly a sufficient justification, however, for a balance sheet valuation of assets at net realisable value, especially as such information can, if deemed necessary, be conveniently provided outside the main body of the accounts.

On the other hand, the appropriate valuation of resources at replacement cost provides a logical link with an operating statement prepared essentially on the same basis and a means for the calculation of a rate of return which indicates the long term viability of current operations. The measurement of operating results and resources in terms of replacement cost

¹⁴G. Macdonald, 'Deprival Value: Its Use and Abuse', op. cit.

¹⁵Ibid.

provides also a basis for the effective assessment of managerial operating efficiency in relation to other firms in an industry or business in general a factor in external reporting which should not be dismissed as lightly as Macdonald appears to have done.

Replacement Cost

For the purposes of this discussion replacement cost is defined as the cost of replacing the economic service potential of the assets owned and used by a business enterprise in operations. It is the belief of the author that replacement cost goes a long way towards meeting the criteria enumerated earlier for inclusion of information in external company reports.

Criterion I:

It is the belief of the author that the use of replacement cost in income determination is relevant to the assessment of the continuing economic viability of operations in terms of the *status quo* in those cases where the aim of operations is to provide goods and services for the purpose of earning income by way of sale above cost. This covers the majority of business situations from manufacturing industries, to retailing, to service industries such as transport and communications. Operating income determined on the basis of replacement cost represents the economic surplus generated from operations, the amount available for reinvestment or distribution to shareholders assuming maintenance of the *status quo*. Within this context the *status quo* is represented by the current operating capacity of the firm. This amount related to the current replacement cost of the resources employed to produce it represents a rate of return which gives an indication of the economic desirability of reinvestment in the economic activity from which the surplus arose.

Amounts generated from operations over and above those necessary to maintain the operating capacity of the firm intact represent a concept of *ex post* income which we shall call *current operating income*.¹⁶

The importance of current operating income in the evaluation of the operating performance of an enterprise will be illustrated with an example. We will assume that the following is the operating statement of a trading firm prepared on the basis of historic cost:

ACCOUNTING AND BUSINESS RESEARCH

Sales, 10,000 units at \$12	\$120,000
Less cost of sales; 10,000 units at \$10	100,000
Profit before tax	\$20,000
Less tax (say 50%)	10,000
Profit after tax	\$10,000

Now assuming that between the time the stocks were acquired and sold their replacement cost increased by, say, 8%, we can re-evaluate the operating results in terms of replacement cost as follows:

Sales, 10,000 units at \$12	\$120,000
Less replacement cost of sales	
10,000 units at \$10.80	108,000
Current operating income	\$12,000
Less tax (50% of taxable income based on historic cost)	10,000
Current operating income after tax	\$2,000

The significance of the current operating income after tax of \$2,000 is that it represents the maximum amount the firm can dispose of and still maintain its current level of operations. For example, if the firm distributed its historic cost profit after tax of \$10,000, it would have to find additional finance of \$8,000 in order to replace the 10,000 units sold and so maintain its operations at the same level.¹⁷

The preceding example was concerned with the replacement cost of trading stocks only. In more close to life examples one should also be concerned with depreciation based on current replacement cost, especially where depreciation forms a significant proportion of total cost. The maintenance of the service potential of depreciable assets may have significant financial implications in the long run. Depreciation determined on the basis of replacement cost may provide an indication of what these implications might be. Quite apart from the financial implications of replacement cost of trading stocks and depreciable assets, the maintenance of the level of operations in times of rising prices would require an increasing monetary investment in debtors even in cases where the physical volume of sales has remained unchanged.

¹⁶Some writers such as Gynther have argued that current operating income is the proper measure of income from the viewpoint of the firm. Gynther's views are based on the entity viewpoint of the firm. R. S. Gynther, 'Accounting for Price-level Changes: Theory and Procedures', Pergamon Press Ltd., 1966.

¹⁷Even if the firm increased its selling price by 8% as soon as the cost of its merchandise rose by 8%, an evaluation of the results in terms of replacement cost would give a valuable insight into the economic implications of the operations of the firm. In this case the economic surplus will be \$6,800 (assuming 50% tax on the historic cost profit of \$29,600) and not \$14,800 as shown by the historic cost calculation.

Replacement cost, therefore, meets our first criterion in that it does provide an effective measure of the viability of current operations in view of current cost. The significance of measuring current operating income on the basis of replacement cost for predicting the future is that a business activity which does not show a surplus on the basis of replacement cost has no long-term viability in view of existing economic conditions. Further, the surpluses generated from operations over and above replacement cost represent the amounts available for distribution and reinvestment, assuming a maintenance of the *status quo* and as such provide an objective and reasonable basis for an attempt to predict the possible course of future managerial action. For example, falling returns in terms of replacement cost could indicate a need to change the direction of activity in the long run. Further, the measurement and reporting of current operating income makes good sense from the viewpoint of financing business operations in both the short and long run. It is the opinion of the writer that the re-interpretation of operating results in terms of replacement cost will provide a better starting point to determine the possible future financial needs and, therefore, cash flows, of an enterprise (given the present state of affairs) than, say, attempts to extrapolate future cash flow trends from statements of, say, historic cash flows (a possibility which was examined by Professor Whittington¹⁸ and was largely found wanting).

Criterion 2:

This criterion required accounting reports to reflect, in effective economic terms, the economic resources of the firm at balance date (i.e., the resources bequeathed to the new period). Replacement cost is rather more difficult to interpret in this context. In order to represent an economic value to the new period, the present value of an asset must be higher than replacement cost. But present value has already been rejected as a direct basis of valuation or as a basis for selecting a method of valuation. In order to justify the use of replacement cost as a basis for asset valuation, it will be necessary to assume that present value is greater than replacement cost and then to test the hypothesis that present value is in fact greater than replacement cost by evaluating and projecting the operating results on the basis of replacement cost. This matter will be discussed further in the next section of this paper.

Criterion 3:

This criterion required the accounts to provide

an effective measure of managerial performance in terms of external comparisons. It is the belief of the author that, conceptually at least, replacement cost meets this criterion better than any alternative. This is so because, if effectively applied by firms, replacement cost would result in both operating results and economic resources being valued by all firms on a comparable basis.

Criterion 4:

This criterion required the measuring and reporting of performance and asset values to be capable of objective application both in relation to the basis of asset valuation used and in relation to the selection of an appropriate basis of asset valuation. Replacement cost is capable of objective measurement in the sense that it can be determined with some reference to current market prices. As stated above, however, as a measure of economic value replacement cost depends on the present value of the assets in question.

The interrelationship among present value, replacement cost and net realisable value in determining value to the firm

As any rational decision regarding the holding, selling or replacement of an asset must be closely related to the present value of the asset, we shall examine the relationship among the present value (PV), net realisable value (NRV) and replacement cost (RC). Before we do this, it should be noted that underlying this discussion is Solomons' view that the upper limit of a value of an asset to a firm is its replacement cost and the lower limit its net realisable value.¹⁹ One exception to this rule, however, will be noted.

The condition for holding an asset

The condition for holding an asset is that the present value of holding the asset is higher than its net realisable value:²⁰

$$PV > NRV$$

If NRV is higher than PV the firm can sell regard-

¹⁹David Solomons, 'Economic and Accounting Concepts of Income', 'Modern Accounting Theory' edited by Morton Backer, Prentice-Hall Inc, Englewood Cliffs, New Jersey, 1966, pp. 117-140. Essentially, Solomons' view was that the value of an asset to a firm cannot be less than the net amount which can be realised on it by way of sale, and that its value cannot be higher than the amount it would take to replace the asset should the firm be deprived of it.

²⁰In these examples PV means the present value of holding the asset. Otherwise the expression $NRV > PV$ will be contradictory in the sense that present value cannot be less than net realisable value. This is so because the extent to which NRV represents a notional receipt now associated with the disposal of the asset, PV cannot be less than NRV.

¹⁸G. Whittington, op. cit.

less of replacement cost. For example, if

$$\text{NRV} > \text{PV} > \text{RC}$$

the firm can sell and the replacement of the asset will be one of the reinvestment alternatives for the proceeds.

If

$$\text{RC} > \text{NRV} > \text{PV}$$

the firm can sell but under these circumstances replacement cannot normally be contemplated.

The condition for replacement cost to represent a measure of economic value to the firm

The condition is

$$\text{PV} > \text{RC}$$

Whether actual replacement would in fact take place would depend on the array of investment opportunities at the time replacement is considered. It will be true to say, however, that for as long as the condition $\text{PV} > \text{RC}$ holds, the replacement of the asset would be one of the investment alternatives which can be usefully considered by the firm.

Valuation at replacement cost and net realisable value

For replacement cost to be considered a valid basis for the valuation of an asset, the condition $\text{PV} > \text{RC}$ must hold. This means that the replacement of the asset must be a rational reinvestment alternative at the time of valuation. It is only when this condition holds that one can regard replacement cost as representing a measure of the economic significance of an asset to the firm. This argument will hold regardless of net realisable value.

For example, if

$$\text{NRV} > \text{PV} > \text{RC}$$

replacement cost will be the relevant basis of valuation as economic value to the firm cannot be higher than replacement cost.

If

$$\text{PV} > \text{RC} > \text{NRV}$$

replacement cost will still be the relevant measure of economic significance. As $\text{PV} > \text{NRV}$, the firm will hold the asset rather than sell it. NRV is not the measure of economic significance in this case. This method of valuation makes sense, for example, in the case where specialised plant has been acquired by a firm because of its high earning potential but which has low or no current net realisable value.

Where

$$\text{PV} > \text{NRV} > \text{RC}$$

replacement cost will again be the relevant basis of valuation as the economic value of the asset to the firm cannot be greater than replacement cost.

We would consider now the situation where

$$\text{RC} > \text{PV} > \text{NRV}$$

ACCOUNTING AND BUSINESS RESEARCH

As $\text{PV} > \text{NRV}$ the condition for holding the asset applies. However, as $\text{RC} > \text{PV}$ replacement cost cannot be accepted as a measure of the economic significance of the asset to the firm. The asset should, therefore, be valued at net realisable value. This valuation makes good economic sense, for example, in the case of plant which does not show profit on a current cost basis but shows adequate profit on a low or non-existent realisable value. Valuation on the basis of net realisable value in this case will be a measure of the economic cost (sacrifice of economic benefit) sustained by the firm by using the plant as an alternative to selling it. Further, in such a case, the valuation of the asset on the basis of realisable value would highlight the essentially short-term nature of the plan for using the plant.

A rather unusual situation arises where

$$\text{NRV} > \text{RC} > \text{PV}$$

As $\text{RC} > \text{PV}$, replacement cost cannot be taken to represent a measure of the economic value of the asset to the firm. The asset, therefore, should be valued at net realisable value as a current measure of economic significance determinable on an 'objective' basis. But $\text{NRV} > \text{RC}$ which means that the asset should be valued at replacement cost on the grounds that the value of an asset to the firm cannot be higher than replacement cost. How can we justify then the use of NRV as a valuation basis in this case? $\text{NRV} > \text{PV}$ means that the asset should be sold, and $\text{RC} > \text{PV}$ means that the asset should not be replaced. $\text{NRV} > \text{PV}$ indicates that the asset has a higher PV to a purchaser than to the present owner of the asset. For this reason replacement cost cannot be taken to represent a measure of the economic significance of the asset to the firm and the proper basis for valuation is net realisable value. It is the author's view that Solomons' constraint of replacement cost as the upper limit of economic value to the firm does not apply in this case.

To summarise, the condition for the valuation of assets at replacement cost is that the replacement of the assets must be a rational reinvestment alternative available to the firm at the time of valuation. In other words, the condition $\text{PV} > \text{RC}$ must hold. This condition applies regardless of realisable value. The condition for the valuation of assets on the basis of realisable value is that at the time of valuation the replacement of the asset is not a rational reinvestment alternative. This condition applies when $\text{RC} > \text{PV}$ and again is independent of realisable value. For example, given that $\text{RC} > \text{PV}$, the possible combinations of PV and NRV are

$$\text{PV} > \text{NRV}$$

$$\text{and } \text{NRV} > \text{PV}$$

In the first case the firm will continue to use the

asset but will not contemplate replacement. In the second case the firm will sell the asset and will not replace if it is to act rationally.

A Valuation Model

The above conclusions, unfortunately, are of little help in setting objective rules of valuation to be applied to a given practical situation. The conditions for valuation in terms of replacement cost or net realisable value $PV > RC$ and $RC > PV$ both depend on present value. The point is that although the valuation method to be applied will be objective, the choice between the two alternatives of replacement cost and net realisable value would be essentially subjective. This would go against the criterion stated earlier that present value should not form a direct basis of valuation or be used as a means of selecting a method of valuation.

It is proposed, therefore, to define the circumstances under which present value can be assumed to be higher than replacement cost and then to use the assumption as a test to determine the extent to which actual events confirm that replacement cost does not in fact exceed present value.

It is proposed that

We assume that all assets held for the purposes of production, trading or provision of services have present values higher than their replacement cost and that, therefore, they should be valued at replacement cost.

Our valuation model as stated has removed the need to refer to present value as a means of choosing between alternative bases of valuation. The simple rule one can derive from the model is that where operations show a surplus on the basis of replacement cost, assets should be valued at replacement cost, and where the position is reversed assets should be valued at net realisable value. A valuation at net realisable value would indicate the essentially short-term nature of the operations.

The above model, however, is far too simple to meet adequately the variety of situations which a firm may face in real life. There are a number of circumstances where continuation of operations may be intended even though operations are currently showing losses in terms of replacement cost. The following are some such cases:

(1) Where operating losses on the basis of replacement cost are considered to be of a temporary nature.

(2) Where it is managerial policy to continue certain operations in the long-run because it is considered that these operations are of benefit to the overall performance of the enterprise.

(3) In the case of public utilities where the goods and services are of such public and social import-

ance that discontinuance is difficult to contemplate. Public utilities and price controlled industries represent a special case which will be discussed later in this paper.

In all the above cases the underlying intention is the continuation of operations. On the other hand the objective of replacement cost accounting is to test the continuing economic viability of operations. We can redefine our valuation model, therefore, as follows:

Replacement cost is the relevant basis of valuation where operations show surpluses on replacement cost or where the intention is to continue to provide goods and services under conditions where replacement cost exceeds revenue.

The valuation model as restated means that net realisable value becomes the relevant basis of valuation where operations show losses on replacement cost and are carried on in the short run only with no intention to replace the assets used up.

How well does the valuation model as redefined meet the criterion that the method of measurement and reporting on performance should be capable of objective application – i.e., that present value should be eliminated from the external reporting system both as a direct basis of valuation and as a means of selecting bases of valuation other than present value?

The model meets the criterion only partially – to the extent that it requires valuation on the basis of replacement cost where operations show surpluses on replacement cost. However, as we cannot use the appearance of operating loss on the basis of replacement cost as an automatic signal for a switch-over to a net realisable value basis of valuation, the model does not meet the objectivity criterion where the use of replacement cost is suggested in spite of operating losses in terms of replacement cost, for example, where operating losses are considered to be of a temporary nature. For the same reason, a decision to use net realisable value for the valuation of assets when operations are intended for the short-run only with no plans for replacement is also based on subjective consideration.

While this shortcoming of the valuation model is admitted, it is the writer's belief that the model goes a long way towards meeting the criterion of objectivity. While not entirely eliminating subjectivity from the valuation process, the model does draw attention to the cases where subjectivity is brought into the valuation process – e.g., where an asset is valued at replacement cost in spite of an operating loss or where there is a switch-over in valuation from replacement cost to net realisable value. In both cases we have statements of managerial expectations which have a bearing on forecasting the future. This

method of reporting would be particularly relevant in the case of a sectionalised enterprise where operating results are reported on a sectional basis.

Replacement Cost and Value to the Firm

The extent to which replacement cost can be used as a measure of economic value to the firm would be subject to the condition $PV > RC$. In the cases where replacement cost is suggested by the valuation model, excess of present value over replacement cost is implied, including (apart perhaps from price controlled industries) those cases where replacement cost valuation is used in spite of current operating losses. It is this implication of excess of present value over replacement cost which attaches economic value to the firm's resources and provides a relevant measure of the economic resources transferred from one accounting period to another.

It is the opinion of the writer that in the case of public utilities and price controlled industries we would need to go beyond the concept of value to the firm. In the case of these industries the prices charged for goods and services are considered of sufficient social importance to have the industries placed under price control. As price control and taxation are normally based on historic cost, situations could arise where the present value of assets to the firm is below their replacement cost. Should such assets then be valued at net realisable value? Under the proposed valuation model the assets should still be valued at replacement cost for as long as no discontinuance of operations is contemplated. It is the opinion of the writer that the measurement of operating profit and asset valuation on the basis of replacement cost in such cases makes good economic and social sense as the resulting information will be relevant for a wide range of decisions not only on the part of shareholders and investors, but also on the part of government as a general regulator of economic activity and by specific regulatory bodies such as the price control authority. For example, when operations show losses on the basis of replacement cost, the loss will be a measure of the subsidy which would have to be provided in the long run if operations are to be continued at current product costs and prices. It would provide also a basis for informed decisions to be made regarding pricing policies under price control, the sources from which the subsidy should be provided, and the position of the investor in such industries.

It is not claimed that reporting in terms of replacement cost will cure all of the economic ills of contemporary society. It is the belief of the writer, however, that it will be a move in the right direction. The reporting of surpluses over and above replace-

ment cost would indicate the ability of firms to continue to provide goods and services, to continue to provide employment, to sustain higher wages, higher costs or lower prices, and to provide an adequate return to investors. It is the opinion of the author also that the reporting of surpluses on the basis of replacement cost will be a better basis for government decisions concerning the control of the level and direction of economic activity, than, say, income measured on the basis of the current cash equivalents of a firm's assets, or the highly inflated profits based on historic cost which are currently reported by many firms.

Summary

The objective of this paper has been to put forward a case for using replacement cost as a basis for external accounting reports. It is the belief of the author that both replacement cost and net realisable value have a place in the general framework of accounting. The basis of asset valuation and income measurement should be in line with the purpose of the investment and the objective of business operations. It is claimed, however, that where the objective of operations is the provision of goods and services on a continuous basis, the appropriate basis of asset valuation and *ex post* income measurement is replacement cost.

Replacement cost provides an effective measure of the economic viability of current operations and the surpluses generated by firms in terms of the *status quo*. It provides an effective measure of managerial performance in relation to other firms in a trade or industry or in relation to business firms in general. Replacement cost reporting can be applied with a high degree of objectivity. Operating results determined on the basis of replacement cost provide a sound basis for the making of a wide range of decisions not only by shareholders and investors, but also by other parties with vested interest in the operations of business enterprises.

The concept of current operating income has been put forward as a relevant measure of income generated from operations. It has not been argued, however, that it represents an absolute measure of business income. Omitted from current operating income are the effects of holding gains and losses. As holding gains and losses do affect the economic value of the resources at the disposal of a firm, there are strong arguments for their inclusion in the calculation of business income.²¹ An examination of the arguments for and against such a concept of income, however, has not been the objective of this paper.

²¹For example, the concept of Business Profit proposed by Edwards and Bell: E. O. Edwards and P. W. Bell, 'The Theory and Measurement of Business Income', University of California Press, Berkeley and Los Angles, 1961.

The Objectives of Published Accounting Reports: A Comment

K. V. Peasnell

The recent article by Bryan Carsberg, Anthony Hope and R. W. Scapens is an interesting addition to the contemporary literature, as it expressly 'attempts to emphasise the importance of the specification of objectives in studies of accounting, to discuss the nature of the various objectives that might be sought and to develop a view as to which objectives should be given priority in studies of accounting methods'.¹

The purpose of this paper is, firstly to show that Professor Carsberg's and his co-authors' conception of what constitutes useful information is extremely restrictive and appears to be based on an erroneous view of the nature of human decision-making processes, particularly the decisions of investors; and secondly, to question the conclusions drawn by the authors from the survey evidence they presented in the second part of their paper. In brief, they argue that alternative accounting disclosure proposals should be evaluated according to their relative 'predictive values', whereas my view is that accounting should encompass both prediction and feedback, but (if a bias has to be shown) with more emphasis on feedback than prediction.

Information for Prediction

Throughout their paper Professor Carsberg and his associates stress that information must be useful. They suggest that a specification of objectives 'must identify the group of people to whom the report is directed, ... the types of action the recipients will take on the basis of the information provided ... [and] what they will want to achieve by their actions' (p. 163). And this line of reasoning leads them to conclude that 'It would not be helpful to be told that the objective was to give a true and fair view of profit' (p. 163). This forms

the basis of the decision-orientated perspective that governs the arguments in the rest of the paper, and enables them to conclude that 'Information provided as a guide for decisions can be useful only if it predicts those future events which can be influenced by the decisions' (p. 166).

Few accountants would disagree with the first part of the above argument, although they might balk at the conclusion that it is tautological to suggest that the objective should be to report profit. However, the real objection is likely to centre on the assertion that accounting information must 'predict'. The difficulties of the 'predictive value' criterion become more obvious when the general prediction framework above is made more specific; that is, when a decision context is established.

Consider the assumption of Carsberg, *et al.*, 'for purposes of illustration, that the objective selected is the provision of information to present shareholders of a company to guide their decisions on buying, holding, or selling shares; and that the shareholders wish to maximise the present value of future cash flows (to maximise wealth)' (p. 164). The study of 'competing accounting conventions' would then reduce to the following steps: (1) the 'specification of all the methods which we might use for preparing accounting reports'; (2) the identification of 'the best model, in association with each several set of accounting conventions, for predicting future cash flows from operations and the broad results of future investment opportunities', which Carsberg *et al.* assume are suitable surrogates of the relevant future events, future dividends; and (3) 'the estimation of which combination of accounting conventions and predictive model would be most useful for decisions' (p. 164).

If only such a programme of research had a hope of being successful! But it cannot be successful for two reasons: first, it suffers from the logical fault of circularity of reasoning; and second, the suggested

¹Bryan Carsberg, Anthony Hope and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, Summer 1974, pp. 162-173 at p. 163.

research methodology is extremely limited in scope and power.

Circularity of Reasoning. The authors, as we have noted, rightly suggest that 'It would not be helpful to be told that the objective was to give a true and fair view of profit – such a statement is vague and, indeed, tautological as a first step in a sequence of arguments designed to indicate how profit should be measured' (p. 163). Yet they make the same mistake themselves when they (a) suggest that 'the relevant future events are dividends which will be paid by the undertaking' (p. 164); and (b) assume that shareholders will regard future cash flows as a surrogate for future dividends (p. 164). No attempt has been made to show that shareholders do, in fact, regard these future events as the relevant future events. It may well be that many shareholders have a short investment time horizon, and that this causes them to be more interested in predicting changes in the price of the company's shares. As future price changes may depend on many factors including expectation of price changes in the yet more distant future, there is no reason to believe that price changes are more than loosely connected to expected future cash flows to the firm. Thus, it cannot be automatically assumed that future cash flows are the variable that shareholders try to predict.

At the same time, it is easy to see why Carsberg *et al* suggest that the 'relevant future events' should be an accounting variable such as cash flows or some concept of profit; and on this point we are in agreement. As I have explained elsewhere,² the accountant has no comparative advantage over investors at large in predicting how share prices will change. Likewise, the amount of dividends is a management policy variable, and therefore has to be augmented by information about other, more fundamental events such as cash flow and/or profit figures. However, it should always be kept in mind that accounting variables are only surrogates of the relevant events, shareholders' returns (dividends and capital gains).

Even if, for argument's sake, we go along with Carsberg, Hope and Scapens in assuming that future cash flow is the variable that investors try to predict, it does not follow that the objective of published accounts should be to provide data of use in predicting such cash flows. It would be more logical to suggest that the objective be to provide: (a) a record of the actual cash flows; and (b) forecasts, explanations and

ACCOUNTING AND BUSINESS RESEARCH

breakdowns to aid the prediction of future cash flows. There is no mention by Carsberg *et al* of the need to provide feedback of actual cash flows; that is, feedback quite separate from any predictive material that might be disclosed as well.

Presumably they meant to say that published accounts should include feedback of actual cash flows. Otherwise, what is the point of shareholders forecasting the surrogate variable cash flows, if the amounts of cash flows obtained are not subsequently revealed?

If, on the other hand, no recognition is given to the feedback function, and prediction is viewed as the sole purpose of accounting, then circularity of reasoning is involved in the creation of accounting concepts. We have a good idea, of course, that shareholders do try to see if there are time series relationships between the reported profits of different periods; that is, that they use past accounting data to predict the profits (or other accounting variables) that will be reported in subsequent periods. But it is important to recognise that the task of the accounting researcher (and the accounting profession) is quite different in nature. Shareholders are faced with a situation where both past and future profit figures (independent and dependent variables) are separately defined and given. If a shareholder decides that the accounting profits (adjusted if necessary) that will be reported in future years is the best surrogate of future returns that is likely to be available, he can be expected to try to use past profit figures to predict future profits. It would be logical to expect the shareholder to adjust past reported profit figures if he thought that doing so would increase prediction accuracy. There is a clear distinction between the future accounting profits to be predicted and the reported accounting profits of past profits that are to be used in the prediction model.

This is not the case with research into the best accounting methods. The accounting researcher, according to the 'predictive value' school of thought, has to devise accounting measurements for period t , say, that will be of help in predicting the accounting measurements of periods $t + 1$, $t + 2$, and so on. Notice that the dichotomy that shareholders can make into past and future measurements is not possible for the accountant as all the measurements are in the future; thus there are no dependent and independent variables. Changing the measurements of period t to increase their predictive value will result in changed measurements in periods $t + 1$, etc.; and all that will be achieved is increased inter-period correlations, or 'smoothing' of profits, the logical result of which is to report constant profits over time.

²K. V. Peasnell, *The Usefulness of Accounting Information to Investors*, ICRA Occasional Paper No. 1 (Lancaster: International Centre for Research in Accounting, Lancaster University, 1973).

This kind of procedure is a kind of pulling accounting up by its own bootstraps, and is about as invalid as would be the judging of the usefulness of an IQ test by the ability of the scorers to predict scores on the same IQ test at a later date. In both cases, there is a lack of independent definition and corroboration; the accounting profit figures and the IQ scores are only required to be stable over time. For the remainder of this paper, it will be assumed that Carsberg *et al* intended the dependent variable, future cash flows, to be separately determined from the predictive accounting data; and it will also be assumed that they intended published accounts to include feedback data as well as predictive data. Unless there is feedback, shareholders are in the 'Alice in Wonderland' situation of predicting events they never get to hear about.

Methodological Limitations. The kind of empirical research work proposed by Carsberg *et al*, that is, the mechanical testing of combinations of predictive models and accounting methods, leaves much to be desired. It might be a bit harsh to call it 'blind empiricism', although it veers in that direction; but it is certainly not unfair to question whether the suggested process has a 'scientific nature', as they suggest.

The authors argue that 'It is no more possible to deduce, by abstract thought, the accounting methods that have the highest predictive value than it is to deduce the laws of gravity' (p. 164). This is true; but it is also true that generations of men were in possession of the empirical 'facts' concerning gravity long before the laws of gravity were formulated. The formulation of those laws only occurred by induction; that is, the brilliantly imaginative leap from the particular to the general. (Einstein's Relativity Theory is an even better example of the role of induction in science, for it has been described as '... so original that it is very difficult, even after the event, to provide it with an ancestry. It was not in the least a natural culmination of the ideas that preceded it. It was a bolt from the blue ... We could say of this theory what Einstein said of some of the work of Gauss, that if its author had not thought of it, there is no reason to suppose that it would ever have been discovered'.³) Clearly, Carsberg *et al* do not intend that the accounting profession await its Einstein or Newton; instead they seem to imply that we already have all the models we need - all we have to do is empirically test them. Nothing could be further from the truth, as should become clear

below.

The suggestion that the 'choice of model would be made by conducting tests to discover which would have given the most successful predictions in past periods' (p. 164) is one that would surprise the economist for it implies that the economy is static; that is, that a 'superior' model for one economic period in the past (for which past results are known) will be superior to other models in the future. We know, of course, that the wealth-maximising shareholders that Carsberg *et al* have in mind want to predict whether or not the firm will make 'excessive' profits in the future, for it is through investing in such firms that, in the long run, investors are likely to achieve superior returns, that is, returns in excess of the market (better than random selection could have obtained). There is also good reason to believe that in a competitive economy the excessive profit opportunities of a firm will tend to erode as other firms enter the industry.⁴ Taken together, these arguments suggest that, in reasonably dynamic situations, empirically determined shareholders' prediction models will tend to become quickly outdated.

This line of reasoning suggests that the process suggested by the authors is most unlikely to identify the best prediction model used by investors. Wealth-maximising investors in an efficient stock market have a strong interest in trying to predict future events more speedily and more accurately than each other; and this means that we can expect the best models to be more complex and subtle than the mechanical models that are suitable for statistical analysis. This is because prediction is a creative process and creativity is the ability to use information in inventive ways. Models cannot do real justice to creative processes, if the results of attempts to programme computers to play chess are anything to go by. At the same time, we cannot expect profit-maximising investors to tell us what predictive models they use. Even if they did so, the information might soon be dated. And yet if choices of accounting methods are based on suboptimal models little or no improvement in the actual predictions of investors could be expected to occur.

Professor Carsberg and his associates seem to be intent on making light of the apparently insuperable problems involved in trying to model investors' predictive processes. Thus we find them suggesting that 'If we found one set of accounting methods led to superior decisions, we should presumably adopt those methods,

³J. W. N. Sullivan, *The Limitations of Science* (New York: The New American Library, 1933), p. 168.

⁴For evidence and arguments in support of this assertion see A. C. Rayner and I. M. D. Little, *Higgledy Piggledy Growth Again: An Investigation of the Predictability of Company Earnings and Dividends in the UK 1951-1961* (Oxford: Basil Blackwell, 1966), pp. 58-64.

making the normal scientific assumption, until discredited by further experience, that the success of predictive models is stable over time' (p. 164, emphasis added). Such an assumption is usually justified when we are dealing with physical phenomena such as gravity, but not so in the case of economic phenomena.⁵ The great over-all processes of economic life – inflation, deflation, depression, recovery, etc., seem to be in part the result of information transmission and, more importantly, the transformation of images that businessmen have of the future. Thus the dynamics of the waves of optimism and pessimism of the business community (to which Pigou long ago attributed the business cycle phenomenon) is still little understood.⁶ A person's images of the future, and hence his predictive models, constantly change as his knowledge grows. It may be, of course, that investors are fairly constant in the ways in which they predict the future and only diverge from tried and trusted predictive models when the consequences of doing so become quite definite; but this is an empirical question, warranting separate investigation. Carsberg, Hope and Scapens have provided no evidence to support their 'stability assumption'.

It is interesting to note that the authors seem to have switched to a different conception of 'relevant future events' in the paragraph from which the above quoted sentence was drawn, for they talk of 'superior decisions' and later on in the same paragraph '... the value of the decision taker's actions ...'. Such a wording necessarily implies the prediction of directly relevant future events, shareholders' returns, rather than surrogate future events, cash flows, for otherwise it would not be possible to determine whether or not the shareholders' welfare had increased. Yet *a priori* reasoning and evidence suggest that models of the determinants of shareholders' returns are highly unstable over time.⁷ Indeed, one writer has remarked that '[after]... two decades of empirical research only the crudest sort of generalisation can be made about those factors

⁵In the physical sciences – chemistry, physics, biology – change is associated only with discovery, with the improving state of knowledge. The matter being studied does not change. In economics, as in the other social sciences, there is change both in the state of knowledge and in what is being studied'. John Kenneth Galbraith, *The New Industrial State* (2nd ed., Boston, Mass.: Houghton Mifflin, 1971), p. 412.

⁶Kenneth E. Boulding, *The Image* (Ann Arbor, Michigan: The University of Michigan Press, 1961), pp. 88–90.

⁷See Stephen L. Meyers, 'The Stationarity Problem in the Use of the Market Model of Security Price Behaviour', *Accounting Review*, XLVIII (April 1973), pp. 318–322; and M. D. Bomford, 'Changes in the Evaluation of Equities', *Investment Analyst*, December 1968.

ACCOUNTING AND BUSINESS RESEARCH

explaining share prices ... [which] suggest that we do need to observe more closely the process of expectation formation'.⁸

Feedback

It is not difficult to agree with them when they say 'Writings on accounting theory have generally been vague about the objectives of accounting reports' (p. 173). Theorists have rarely identified in any detail who the users are and the nature of their information needs, generally being content to use the 'entrepreneur' of economic theory as their ideal of the user. However, Carsberg *et al* have also been guilty of the same kind of vagueness; for example, they say in their review of their interview findings: 'These arguments do not suggest that there are different objectives in reporting to small and large investors, but may suggest the need for different means of satisfying them' (p. 170). Yet a careful evaluation of the decision problems of investors suggests that the objectives of the two groups cannot be the same; in particular, unsophisticated investors will rarely, if ever, be able to increase the value of their decisions by acting on published predictive value data because the market reacts very quickly to public information. The accounting profession '... should actively discourage [unsophisticated] investors' beliefs that accounting data can be used to detect overvalued or undervalued securities'.⁹

Unsophisticated investors should act as price takers, concentrating largely on containing risks within acceptable limits and minimising portfolio costs. The published accounts can only serve a feedback role: a source of historical data of help in risk management. Paradoxically, if the objectives programme of Carsberg *et al* were to be accepted by the accounting profession, it seems possible that the main result would be to mislead the unsophisticated investors into thinking that they could 'beat the market', thereby causing them to suffer unnecessary risks, despite the obvious intention of the authors to improve the lot of investors.

As all investors can benefit from feedback, reporting objectives should place more emphasis on feedback than on prediction. To place the emphasis on prediction would be to abandon accounting as it now exists for very uncertain benefits; and there is no evidence that change of this kind is what investors want.

⁸Michael Keenan, 'Models of Equity Valuation: The Great Serum Bubble', *Journal of Finance*, XXV (May 1970), pp. 264–265.

⁹William H. Beaver, 'What should be the FASB's Objectives?', *Journal of Accountancy*, August 1973, p. 53.

At the same time, accounting theorists who advocate '... excluding anticipatory calculations from the domain of accounting'¹⁰ go too far. If, as has been argued,¹¹ one of the main objectives of financial reporting should be to prevent abnormal returns accruing to insiders, it is important to disclose as much 'predictive' data as possible to the market. Preferably, this would be in the form of explicit company forecasts of future events (and states), backed up by reasons and explanations. Such data should not be confused with the feedback data.

The Surveys

Surveys of investors in Britain and America have revealed little or no interest in the prospect of major changes in accounting; and it seems certain that the accounting profession will be hostile to the 'predictive value' process. The findings of the surveys made by Carsberg *et al* of the opinions of accountants in Britain is not evidence to the contrary; that is, it is not evidence of the growing acceptance of some such criterion as predictive value.

Doubtless, all accountants would agree with Carsberg *et al* that '... information is strictly valueless unless there is some chance that it will influence future actions' (p. 173); this is not in dispute. However, feedback data can influence future actions, even if at practically all times it only acts as confirmation of prior (and exogenously determined) expectations, for as long as prediction errors are expected to occur investors will need to check their predictions. For example, assessments of risk are themselves uncertain in a psychological sense and can be altered by feedback. This being so, it is quite possible '... that considerable importance is now attached by members of the accounting profession to the investment decision objective ...' (p. 172), and yet at the same time for accountants to reject predictive value. No inconsistency need exist, as long as they realise (perhaps intuitively) the importance of the feedback function of published accounts.

The analysis and interpretation of Carsberg *et al*'s survey evidence leaves a lot to be desired; and this is a pity because it makes the evaluation of an otherwise useful piece of empirical work extremely difficult. For example, in Table 3 on page 171 they present the average scores given by the respondents to various purposes of published accounts without

any statistical significance tests of the extent of agreement between respondents. Without such tests,¹² one cannot agree with Carsberg *et al* that '... averages seem to be a reasonable way of summarising the replies' (p. 171) because the averaging procedure is based on the, in this case, erroneous assumption that the measurements are in the interval scale.

The authors failed to test their suggestion that 'A decision-taking approach would presumably emphasise "relevance to purpose" whereas "objectivity" might be viewed as especially important in relation to stewardship' (p. 172); and yet all they had to do was test whether or not a high score on the 'stewardship' purpose was positively associated with a high relative score (the difference between 'relevance to purpose' and 'objectivity' scores). It could be that objectivity is not particularly associated with stewardship accounting; instead, it might be that objectivity is viewed by accountants as an important requirement of (feedback?) data for decision-takers. As it is, the evidence given in Tables 3 and 4 (for what they are worth) seems to flatly contradict the conclusion of Carsberg *et al* above. That is, they say that the high ranking given to 'relevance purpose' and the low ranking of 'objectivity' '... provides some secondary evidence about the strength of opinion in favour of a decision-taking emphasis as opposed to stewardship' (p. 172). If this were so, we would expect to find a higher rating given to information for decision-taking than to information for stewardship; and yet Table 3 indicates that the reverse was the case.

The association of 'relevance to purpose' with decision-taking to the exclusion of stewardship was not explained by the authors, presumably because they thought it to be self-evident. And yet stewardship is as much a 'purpose' as decision-taking. Could it be that the survey respondents assigned the word 'purpose' its dictionary meaning of 'object, thing intended' (*Concise Oxford Dictionary*) and not the specialised (and undisclosed) meaning that Carsberg *et al* intended? In any case, a test of correlation between 'purposes of information' and 'relevance to purpose' might have indicated what the respondents thought purpose meant.

It would also have been interesting to see if there was any observable relationship between the scores assigned to the various 'accounting criteria' (Table 4) and the various 'supplementary data' items (Table 5). It may be, for example, that, on average, a

¹⁰Raymond J. Chambers, *Accounting, Evaluation and Economic Behavior* (Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1966), p. 97. See also F. K. Wright, 'A Theory of Financial Accounting', *Journal of Business Finance*, 2 (Autumn 1970), pp. 58-63.

¹¹Beaver, *op cit.*, pp. 52-53.

¹²The Kendall Coefficient of Concordance W test is a suitable nonparametric test; see Sidney Siegel, *Non-parametric Statistics for the Behavioral Sciences* (New York: McGraw Hill, 1968), pp. 229-238.

respondent's score on 'uniformity', 'conservatism' or 'objectivity' is associated with the scores given to the various 'forecasts' and with 'current values of assets'.

Conclusions

The main weakness of Carsberg *et al*'s paper is its espousal of 'predictive value' as the appropriate criterion for testing the usefulness of company accounts. Their analysis seems deficient in the following aspects: (1) no explanation is given of how accountants are to identify the 'relevant future events', and they fail to distinguish between 'directly relevant future events' and 'surrogate future events'; (2) there is no sign that they recognise the diffi-

ACCOUNTING AND BUSINESS RESEARCH

culties (which seem to this writer to be insuperable) of identifying the best model used by decision-takers; (3) the need for feedback as well as prediction is completely ignored; (4) they make light of the very real differences in the information needs of sophisticated and unsophisticated investors; and (5) their survey findings do not support their conclusions and inferences.

Acknowledgement

The author is indebted to his colleagues at the International Centre for Research in Accounting, Ian Dalzell, Clive Emmanuel, Sid Gray and Edward Stamp for their helpful criticisms of an earlier draft.

Book Reviews

International Register of Research in Accounting and Finance, Issue 1, Spring 1974, IRRAF, twice-yearly, £4 per annum.

The value of a directory such as this depends upon positive answers to three questions:

First, does it collect data on a useful topic which is not conveniently available elsewhere? It is certainly valuable to those engaged in research in accounting and finance (using all those terms in the widest sense) to know what others are doing in the same field. I know of no alternative systematic source of this information. The avoidance of duplicated effort and the linking-up of those working in closely-related topics provide ample justification for the investment in such a register. I suspect also that the nagging feeling that each academic should have that he ought to have an open entry on the register may be valuable in its own right. I have several reasons why I have not yet submitted an entry, but I do not find any of them entirely satisfactory.

The second question is: does the directory arrange the data it collects so that all likely types of retrieval are facilitated? This register scores quite highly in this test. Each project is allocated to one of nine 'primary subjects' - methodology, financial accounting, managerial accounting, non-profit and regulated organisations, business finance, auditing, taxation, accounting profession and others. Entries in each issue of the register are in primary subject order. Projects may also be allocated to one or more 'secondary subjects' from the same list; there is an index of secondary subjects so that the relevant project entries can be found despite the fact that they are listed in primary subject order.

Projects are also assigned keywords - anything from one to about twelve per project - to indicate more specifically the subject area of the project. There is an index of keywords. There is also an index of research personnel, locations of research and financial supporters of research. It is not clear whether there will be any cumulative indexes in later issues or whether each issue will have to be searched independently.

Each entry has also a code for the researcher classification - whether in an academic institution, a professional firm, a professional body or an indus-

trial or commercial organisation - and a code for the country to which the research relates, including a NIL code for theoretical studies. Each entry includes an abstract of the topic, starting and estimated completion dates, references to interim and final published results and the language in which the study is being undertaken.

The third question in testing the value of such a register is: does it collect the data inputs on a sufficiently comprehensive basis to make it a reliable source? It must be said at once that it would be quite unfair to judge this on the basis of a first issue. This issue is a major part of the publicity designed to elicit the data for subsequent issues. There are 76 projects listed in the first issue. A disproportionate number of them are associated in some way with the sponsors of the register - the Institute of Chartered Accountants in England and Wales, the International Centre for Research in Accounting of the University of Lancaster and the Journal of Business Finance and Accounting. This is inevitable. Whether it broadens its base in future issues now that its existence is known remains to be seen. The publishers have done what is necessary but not what is sufficient to produce a valuable source of information. It will only become valuable if accounting research is being undertaken, and if those who are undertaking it give the necessary details to the Associate Editor of IRRAF at Furness College, Lancaster.

Peter Bird

Human Resource Accounting Eric Flamboltz (Dickenson Publishing Company Inc) 380 + xviii pp. For a start this book is a beautiful piece of printing and bookbinding; more than one colleague claims to have been surprised to see your reviewer apparently engrossed in a presentation missal or bible! In fact it is likely to become a sort of 'bible' for those who concern themselves with human resource accounting, even if (like your reviewer) they may suspect that while it is long on behavioural science, it may be a little short on accounting theory and practice. At the outset, one might ask who is concerned with human resource accounting. By and large the accountants in this country, both academic

and otherwise, are less interested in this topic than their North American counterparts. However, British organisations now seem very conscious of the fact that all their plans can be set at nought by the one factor of production about which they have little hard information. Since the announcement of his SSRC grant in this area, your reviewer has been approached by a large number of 'blue chip' companies, all embarking on exercises in some aspect of human resource accounting.

The book is a fair summary of the current state of the art, at least in the United States and Canada. Some part of the activity is in the construction of 'econometric'-type models which seek to demonstrate a cause-and-effect relationship between two or more series of figures. This approach is that used by Giles and Robinson in this country, and has been discussed at some length in my earlier review of their book; a number of behaviourally more sophisticated versions are cited here. On the other hand, a good deal of the work described, especially in the fair number of case-studies, is of a straightforward 'accounting' nature and this too is most interesting. Professor Flamholtz more than once refers to the use of informed estimates of such costs as recruitment and training, in terms which suggest that this is done because of a deficiency in present-day costing techniques, which can be overcome by further research. Nowhere does he consider the possibility that concepts such as 'the cost of training' may not be found in the present records simply because they are meaningless.

How can one reconcile one's mental concurrence in the proposition that the *fact* of training new staff ought to be taken into account in evaluating the performance of a newly set up branch with the certainty in one's gut that any firm which actually capitalises the *cost* of such items is heading for disaster? Another piece of research activity at Birmingham University may supply the clue. A research group of local accountants under the guidance of Dr. Roger Groves has been attempting to establish the cost of training different types of qualified accountants in different organisations. What they are finding is that there are many ways in which a firm can organise its personnel function, and this clearly has a most profound effect on the costs reported. Now this might *seem* to be significant, since a lot of research has been devoted to the effects of different styles of management and different organisational structures (the book mentions this material more than once). However, closer examination shows that a large part of such costs are the outcome of distinctly tendentious allocations and reallocations of personnel and administration overhead.

ACCOUNTING AND BUSINESS RESEARCH

Even if one became convinced of their 'correctness', their 'validity' could only be that of other joint-costs, full-absorption-costs (and even shadow-prices) — entirely dependent upon the fulfilment of some rather narrow conditions as to activity.

It can be seen that this extraordinarily interesting book provides insights into many general accounting problems. Consider what one of the case-studies has to say about asset valuation:

This describes the situation at the University of Michigan in the spring of 1971, when the local state legislature was proposing to cut its budget. The outraged academics were suggesting that the resulting discrepancy between Michigan salaries and those attainable elsewhere would lead to mass resignations of staff. In particular the great Rensis Likert undertook a study which suggested that it would cost \$1.7 billion to replace the present faculty members. One of the questions on this case (p. 46) runs as follows: 'Assuming that you feel Likert's comments are valid, how should you take them into account in making decisions on the university's budget?' One suspects that the reaction of the legislators may have been akin to that of the Duke of Bedford when he first found himself the owner of Woburn Abbey, plus its death duties and upkeep; they might well feel that it is wealth like that which puts you in the poorhouse.

When is an asset not an asset? If you buy a truck you own a moderately intricate mass of machined metal and plastic; if you train a driver for it, you just own his 'service state value' (as Professor Flamholtz puts it), which is his discounted future earnings multiplied by the conditional probability that a trained HGV driver won't quit his job. As they stand, both 'assets' are no more than commitments to future expenditure: how you get them together to produce the benefit of 'transportation' is quite another thing. What this 'thing' is, is a socio-economic system, and Professor Flamholtz and behavioural scientists seem to be saying that although present-day accounting doesn't help much over handling such concepts, greater refinements in the techniques of measurement and analysis would produce the desired data. A systems engineer would probably claim that both the problem of arriving at meaningful joint-costs and our difficulties over value-as-a-going-concern proceed from the same basic fallacy — our determination to achieve some sort of two-dimensional, static representation of an essentially dynamic reality. This is more a criticism of the current state of the art than of Eric Flamholtz's work; indeed, it is by focusing our attention on new types of assets and expenses in this way that we may be led to seeing how we were going wrong over our

treatment of the old.

Possibly the most serious complaint about the book is of a tendency to wobble between discussions of valuation and behavioural measurement of the individual and of groups of individuals. Of course, this merely reflects a similar shortcoming in the underlying behavioural science and to be fair, Professor Flamholtz seems well aware of the existence of this dichotomy, if he does little to bridge it. As one might suppose, the survey-based work tends to the individual and the 'econometric' work to the group; since accounting usually takes data at a low level of aggregation and builds it up into more global statements it seems likely that this is the area

which will have to be cleared up before HRA becomes a routine chore. But these criticisms are of no real account in the one thing that matters. Yes, you ought to buy this book; you will find yourselves becoming increasingly concerned with the material it discusses for the rest of your professional career. It provides an excellent summary of the behaviouralist material which is particularly relevant to human resource accounting, and Professor Flamholtz's own contribution is a good starting point (and maybe the only starting point) for the development of the necessary extensions to accounting technique.

Trevor Gambling

Contributors to Accounting and Business Research

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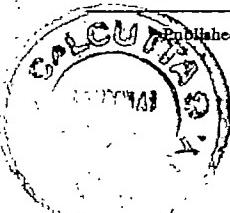
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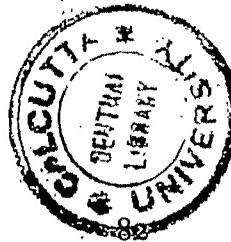
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Contents



Evidence of the Impact of Inflation Accounting on Share Prices	R. C. Morris	
✓ A Further Comment on Asset Values and Income Measurement	S. J. Gray M. C. Wells	91
Reporting Business Performance	John Arnold Anthony Hope	96
What Price Shares?	Brian Pizzala	106
Individual Purchasing Power Indices and Accounting Reports	Michael Bromwich	118
Comparative Returns for Institutional Property Investors	V. Fieldgrass	123
Oil Company Accounts; Not So Comparable	J. W. H. Trueman	127
Profit Forecast Disclosure: The Effect on Managerial Behaviour	Kenneth R. Ferris	133
Empirical Research into Information Utility and Acceptability	T. A. Lee	140
The Financing of Rapid Growth Firms up to Flotation	P. J. Hutchinson J. A. Piper G. A. Ray	145
The Objectives of Published Accounting Reports: Reply to a Comment	Bryan Carsberg Anthony Hope R. W. Scapens	152
Book Reviews		156
Notes on Contributors to this issue		159

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Evidence of the Impact of Inflation Accounting on Share Prices

R. C. Morris

I The impact of general indexed earnings on share prices

Inflation accounting and the investing public

In recent discussions on inflation accounting it seems to have been widely assumed that one of the main bodies to benefit from the publication of supplementary information will be the investing public. However, it is far from clear how such information can directly help *individual* investors since published data will immediately be impounded in share prices – assuming, of course, that it is regarded as having valuable informational content by the market at large. Individual investors can only benefit by having prior knowledge or by chance at the expense of other investors.¹

The market itself, of course, still has to determine share prices. To establish such intrinsic values, essentially it has to decide what pieces of current information are good predictors of prices that will be set in the future.

It should thus be apparent that inflation accounting along the lines proposed in SSAP² will have little impact on the stock market unless brokers, jobbers and the institutions feel that inflation adjusted figures are those they should use in determining current share prices.

¹For a brief description of this view of the market, see R. C. Morris, 'Corporate Reporting Standards and the 4th Directive', Occasional Paper No. 2 of the Research Committee of the Institute of Chartered Accountants in England and Wales, 1974, p. 57–60. For a fuller discussion, see E. F. Fama, 'Efficient Capital Markets: A Review of Theory and Empirical Work', *Journal of Finance*, 1970; and for an examination of its far reaching implications for accountants, see W. H. Beaver, 'The Behaviour of Security Prices and its Implications for Accounting Research (Methods)', *Accounting Review*, 1972: Supplement of the Committee Reports of the AAA; and N. J. Gonedes, 'Efficient Markets and External Accounting', *Accounting Review*, 1972.

²'Accounting for Changes in the Purchasing Power of Money', Provisional Statement of Standard Accounting Practice (SSAP 7), *Accountancy*, June 1974.

Investment analysts, of course, have always been aware that figures shown relating to the *past* are but one piece of information available to them, and an examination of a small sample of the multitude of brokers' company forecasts at a particular point in time makes it quite clear that non-accounting information is of the utmost importance in enabling analysts to produce crude budget predictions.³ Equally it is well known that qualitative and to some extent quantitative adjustments to published accounting figures are made to present information on a more comparable basis. Thus, for instance, attempts by management to manipulate reported profit figures by what is variously known as cosmetic reporting or reserve- or creative-accounting have probably been largely self-defeating, so long as the nature of the manipulation has had to be disclosed in the accounts.⁴ Similarly, some broking firms are known to have calculated adjusted figures to allow for changes in price levels – an apparently common procedure being to attribute an approximate current value to long-lived assets such as land and buildings; others have made allowance for the impact of general price level movements.

It should be clear, then, that there is little value from the investment point of view in making these adjustments to published accounts *unless* the market

³This is hardly surprising in view of the fact that according to studies by A. C. Rayner and I. M. F. Little, 'Higgledy Piggledy Growth Again', Basil Blackwell, Oxford: 1966; R. Ball and R. Watts, 'Some Time Series Properties of Accounting Income', *Journal of Finance*, 1972; and others, earnings figures appear to have little predictive significance. See also R. C. Morris, op. cit., p. 63.

⁴See, for instance, R. Ball, 'Changes in Accounting Techniques and Stock Prices', *Journal of Accounting Research*, 1972: Supplement on Empirical Research in Accounting: Selected Studies; R. S. Kaplan and R. Roll, 'Investor Evaluation of Accounting Information: Some Empirical Evidence', *Journal of Business*, 1972; and other studies referred to by R. C. Morris, op. cit., p. 59, footnote 18.

impounds the information into share prices; or the data themselves are better predictors of future share prices than are existing (unadjusted) accounting indicators.

There are thus two important questions which need to be asked.

- (1) To what extent does the market impound inflation adjusted data into share prices? and
- (2) are price level adjusted data better predictors of future share prices than unadjusted data?

Some research has been undertaken on the latter point in the United States to see whether or not there is stronger serial correlation through time for adjusted profit figures than for conventional income statistics.⁵ On the whole the results have been somewhat inconclusive – which is hardly surprising since the researchers have either unrealistically had to adjust real-world data with the advantage of hindsight; or instead have had to resort to sophisticated but artificial laboratory experiments. As far as one is aware, however, little or nothing has been done to provide an answer to the first question, though a number of surveys suggest analysts regard price level adjusted data (especially where replacement cost values are used) as being helpful additional information.⁶

The impact of inflation on market prices

Empirically there is evidence that the market has allowed in part at least for the effects of inflation in recent years. Thus by industry categories those sectors most vulnerable to inflation have in general performed worse than the FT-Actuaries all share index in the period 1968–1973, while those with high

external gearing and owning property have shown the greatest gains over the six year period.⁷

However, at the present time the market appears to have reacted little to the SSAP 7 inflation adjusted results so far published by some 20–25 companies, and indeed the financial press seems to have greeted the statements with little more than mild curiosity. (For the most part, anyway, the companies concerned have not reported supplementary figures which the market regards as severely damaging: GKN, for instance, with an adjusted 20 per cent fall in profits, was described by the *Investors Chronicle* as 'coming out well in its accounting for inflation statement'!)⁸

Nevertheless, even if most companies have yet to apply SSAP 7 it is perfectly possible for outsiders to make approximate adjustments to allow for the effects of changing price levels. This can even be done using special price indices appropriate to different types of non-monetary assets owned by companies if asset categories are sufficiently well-defined and the nature of the fixed assets involved is apparent. It is rather easier, however, to make general price-level adjustments of the nature envisaged in SSAP 7. (Indeed, the fact that such adjustments can be fairly easily made by outsiders has been advanced as one very good reason why current cost accounting should be preferred to mere general index adjustments.)⁹

Pioneer work on producing price-level adjusted figures for quoted companies on a regular basis has been undertaken over the past few years by R. S. Cutler of the brokers Phillips and Drew. The companies whose results have been adjusted are amongst the largest in the country, accounting for about 75 per cent of the capitalized market value of equities quoted in London (excluding investment trusts). Certainly the information thus made available covers a wide enough spectrum to make it feasible for the investing public in the form of institutional investors and brokers to use this price level adjusted data in setting the relative market values of equities.

Cutler's first analysis covered 132 quoted companies, and the results were published in the *Phillips and Drew Market Review*, December 1971.¹⁰ The

⁵See, for instance, W. Frank, 'A Study of the Predictive Significance of Two Income Measures', *Journal of Accounting Research*, 1969; R. A. Samuelson, 'Prediction and Price-Level Adjustment', *Journal of Accounting Research*, 1972; M. N. Greenball, 'Evaluation of the Usefulness to Investors of Different Accounting Estimators of Earnings: A Simulation Approach', *Journal of Accounting Research*, 1968: Supplement on Empirical Research in Accounting: Selected Studies; J. K. Simmons and J. Gray, 'An Investigation of the Effect of Differing Accounting Frameworks on the Prediction of Net Income', *Accounting Review*, 1969; and E. V. McIntyre, 'Current Cost Financial Statements and Common Stock Investment Decisions', *Accounting Review*, 1973.

⁶e.g. T. R. Dyckman, 'Investment Analysis and General Price-Level Adjustments', *Studies in Accounting Research* I, American Accounting Association, Evanston, Ill.: 1969;

⁷P. W. Parker and P. M. D. Gibbs, 'Accounting for Inflation – Recent Proposals and their Effects', *Journal of the Institute of Actuaries*, 1974, paras. 36–37.

information, though circulating widely in the City, apparently 'appeared to have very little effect on stock exchange prices'.¹¹ Nevertheless, the possibilities and implications had been aired, if only to a relatively narrow audience.

In the autumn of 1971, just before Cutler's calculations were published, the Institute of Chartered Accountants in England and Wales released a discussion document on inflation accounting.¹² Over the next few months interest in inflation accounting quickened and was heightened by the publication in January 1973 of an exposure draft of proposed standard accounting practice (ED8).¹³ This was followed soon afterwards by the publication of a second and more detailed analysis of the adjusted results for almost the same population of companies in the March 1973 issue of *Accountancy*.¹⁴ The article, authored by Cutler and C. A. Westwick of the Institute, aroused widespread interest and comment in the financial press.¹⁵ Certainly it is safe to say the results reached a far wider audience, and by showing the extent to which share prices might have to be adjusted to reflect the effects of inflation the implications were obvious.

Since then several other broking firms have been experimenting with inflation adjustments applied to conventionally published accounting figures. However, it appears Phillips and Drew still lead the field in this area, promoting seminars on the topic, updating the adjusted figures, and producing a detailed study of the incidence of inflation in the engineering sector. Most importantly, though, two of the firm's partners presented an influential and widely reported paper to the Institute of Actuaries in April 1974.¹⁶ In this the authors, P. W. Parker and P. M. D. Gibbs, did not merely examine the relative merits of current cost and general index accounting, but also reproduced the updated figures for inflation adjusted

¹¹P. R. A. Kirkman, 'Accounting Under Inflationary Conditions', Geo. Allen and Unwin, London: 1974, p. 115.

¹²Institute of Chartered Accountants in England and Wales, 'Inflation and Accounts', Discussion Paper of the Accounting Standards Steering Committee: *Accountancy*, September 1971.

¹³Institute of Chartered Accountants in England and Wales, 'Accounting for Changes in the Purchasing Power of Money', Proposed Statement of Standard Accounting Practice, ED8: *Accountancy*, March 1973.

¹⁴R. S. Cutler and C. A. Westwick, 'The Impact of Inflation Accounting on the Stock Market', *Accountancy*, March 1973.

¹⁵e.g. *Sunday Times* 4th March 1973; *Guardian* 5th March 1973; *Daily Telegraph* 5th March 1973.

¹⁶P. W. Parker and P. M. D. Gibbs, op. cit. Since this study was completed in July 1974, more recent Phillips and Drew figures have been published: P. W. Parker and P. M. D. Gibbs, 'Inflation Accounting and its Effects', *Accountancy*, September 1974.

ACCOUNTING AND BUSINESS RESEARCH

earnings for 120 companies.

Clearly, the market has had access to inflation adjusted earnings for most sizeable companies since December 1971, and it is possible to identify three separate occasions when a full and comparable list of inflation adjusted earnings figures has been published. Of course, while it is true that the adjustments made by Cutler and his associates have had to be approximate in nature, there is little reason to believe their estimates are very wide of the mark. Indeed, where companies have published SSAP 7 statements the results can be compared with Phillips and Drew estimates – and in most cases the brokers' calculations seem to have been remarkably close.¹⁷ Moreover, it should be pointed out that all that is really wanted is an approximate indication of the size of the inflationary error – accuracy is an elusive quality in terms of earnings figures, which anyway may be very poor indicators of future likely performance.

In the circumstances, as Kirkman has observed, it would be extremely interesting to see whether or not the stock market has taken any notice of the Phillips and Drew data.¹⁸ Rather surprisingly no-one yet seems to have tried to test this, so it was to remedy the situation that the current study was undertaken.

The methodology

A widely accepted model of share price movements is the Markowitz 'market model',¹⁹ which defines the stochastic process generating share price changes (or returns on investment in a share) as

$$R_{it} = \alpha_i + \beta_i R'_{mt} + u_{it}$$

where R_{it} = the return of share i in period t

R'_{mt} = the market factor in period t

α_i , β_i = intercept and slope of the linear relationship between R_{it} and R'_{mt}

u_{it} = stochastic portion of the individualistic component of R_{it}

Simply put the model proposes that there is a linear relationship between the price movements of a share (i) and the market-wide factors. Any residual movement after market-wide effects have been removed is reflected as the u_{it} term, which is expected to be stochastic.

¹⁷See R. S. Cutler, text of a talk given at the Phillips and Drew seminar on 'Accounting for Inflation' at the Plaisterers' Hall, London Wall, 24th July 1973: Table 1. But see also J. M. Boersma, 'Can General Price-level Adjusted Statements be Approximated by the Outsider?', *Accountancy*, May 1974.

¹⁸P. R. A. Kirkman, op. cit., p. 116.

¹⁹For a clear exposition of the model in this context, see W. H. Beaver, op. cit.

In practice share price movements reflect not merely market-wide effects but also an industry factor. Operationally it is possible to approximate these factors by calculating the return on the market- and an industry-portfolio and thus isolate the residual reflecting that part of return on a share which reflects information peculiar to it. For this purpose, however, the security under scrutiny should technically be excluded from the portfolio. Empirical studies in the United States in fact show that about half the movement in the price of an individual share can be explained by its co-movement with the market factor and a further ten per cent relates to industry-wide events.²⁰

In the present study a simple approach has been used. It has been assumed that the FT-Actuaries all share and industry indices provide adequate indicators of market- and industry-wide price movements, thus enabling residual price changes to be isolated. However, it should be remembered that these indices are weighted according to the capitalized market values of securities.²¹ Since the indices include almost all the shares under scrutiny, and the companies are among the largest in the country, there is a bias in the procedure. For the market-wide factor it is probably unimportant, but in abstracting industry effects it could cast serious doubt on the validity of the results. Consequently more attention should probably be paid to the findings where only a market-wide factor was taken out of the price movements, especially as the impact of industry effects is relatively insignificant. Nevertheless, some results derived when industry-wide events were taken out of the data have also been presented, though the reader should treat these findings with caution.

There are various ways of testing residual price movements to see whether they relate to any particular piece of information available to the market. One method is to see whether the residual price changes (u_{it}) are larger in a period when information is available to the market than at other times, the inference being that the news has led to changed expectations. This method is appropriate for testing over short time spans and where the news announcement can clearly be identified in time; it can also be backed up by an examination of the level of trading activity, which is another indicator of changed

expectations on the part of investors.²²

An alternative approach, which has been widely used in the United States in recent years, is to see whether the price residuals (u_{it}) move in the expected direction following the publication of a piece of news. The data can be examined in various ways, but the methods most widely adopted nowadays were pioneered in an accounting context by Ball and Brown.²³ In fact a simplified version of their approach has been employed in this study since it seems most appropriate.

Two tests have been applied to the data. The first is a simple comparison between the signs of the actual residual price movements and those 'forecast' by the inflation adjusted earnings figures. Thus if the 'real' earnings are lower than the conventional profit figures reported, it seems not unreasonable to expect the relative price of a share to fall; if higher, the market might be expected to mark it upwards. (Indeed, in the Cutler and Westwick article this was specifically suggested and notional 'new' prices given). It should therefore be possible to see whether the direction of the price movements was as predicted. This can be achieved quite simply by using a chi-square test to see whether one can reject a null hypothesis that the combination of the signs of price movements (either in the same direction as 'predicted', or in the opposite) occurred by chance.

The second test requires the use of a simplified version of the Ball and Brown 'Abnormal Performance Index' (API). This can be defined as

$$\text{API} = \frac{1}{I} \sum_{i=1}^{I-1} u_i$$

where the u factors represent residual percentage gains and losses on shares after the appropriate 'bull' or 'bear' strategies suggested by the differences between actual and inflation adjusted earnings have been adopted. The API can be calculated for each time span examined to give the relative profit for £1 'invested' in equal amounts in all shares ($i = 1, 2, \dots, I$)

²⁰B. F. King, 'Market and Industry Factors in Stock Prices Behaviour', *Journal of Business*, 1966; S. L. Meyers, 'A Re-examination of Market and Industry Factors in Stock Price Behaviour', *Journal of Finance*, 1973.

²¹'Guide to Financial Times Statistics, the *Financial Times*', London: 1973.

²²R. Ball and P. Brown, 'An Empirical Evaluation of Accounting Income Numbers', *Journal of Accounting Research*, 1968.

over that period.

To amplify briefly, the relative profit is found in the following manner. Firstly, the percentage change in each share price is calculated and the proportion of expected change due to market- or industry-wide effects eliminated. The resultant residuals are then summed in two subsets, according to whether the difference between actual and inflation adjusted earnings suggests that a rise or fall in share price can be expected. Then, after appropriate adjustments to the signs, the results are added together and divided by the number of shares under scrutiny to produce the overall API coefficient. (Normally one would have to allow for dividends received as well, but for reasons which will be given presently this refinement was not adopted in this study.)

The API can intuitively be interpreted as showing the net gain an individual would have made over a period by constructing a portfolio specifically using the information before it was published in the hope of subsequently beating the market. This would be achieved by taking 'bull' positions on shares which inflation adjusted earnings indicated were 'under-valued', and 'bear' positions on those which appeared to be 'overvalued'.

The empirical evidence

In testing the data most attention was concentrated on the Cutler-Westwick article, since the figures contained in it received a good deal of publicity. For the first test market reaction was examined for 136 of the 137 companies they dealt with over an arbitrary period, approximately two weeks after publication of *Accountancy*. (The 137th company was ignored, in fact, as there was no material difference between its reported and inflation-adjusted earnings). The bench marks used for calculating movements in share prices were the quotations given in the article showing closing prices on February 1st, 1973²⁴ – i.e. there was a six week span over which price movements were calculated.

It can be seen from Tables 1 and 2 that the null hypothesis based on the simple sign test is not rejected, and the API values are negative in the case where market residuals were examined and are too low even to cover dealing costs when industry effects are removed. The inference is clear that the market found little information content in the publication of the inflation adjusted figures – either because it

ACCOUNTING AND BUSINESS RESEARCH

had already made its adjustments; or because it chose in general not to regard such data as being relevant to its deliberations.

It might be suggested that for many companies the differences between actual prices and those suggested by Cutler and Westwick were negligible and would either have been ignored anyway by the market or would have been saturated by general noise. As a result it was decided to re-run the tests for a subset of companies showing sizeable price (or earnings) 'errors'. The criterion used was a difference of 30 per cent or over.

Again it can be seen that at two weeks the indicators suggest the market did not find the information particularly valuable. The APIs are negative and the sign movements were actually in the opposite direction to what might have been expected. Moreover, when these data were further partitioned to isolate those shares most over- and under-valued, the API values were even less suggestive of there being informational content in the figures as far as the market was concerned.

Further tests of the subset of companies where the error was 30 per cent and over were tried for three other intervals on the Cutler-Westwick data: at four weeks from the publication of *Accountancy*, at five months, and at eleven months. It can be seen that the results are not materially different, even at eleven months, when the market was spiralling downwards in face of the three day week. This is particularly interesting since at a distance of one year from the bench mark date the new prices must have been influenced by new (conventional) earnings figures.

As for the less widely exposed Cutler data, published in December 1971, similar tests on companies showing earnings errors of 20 per cent or above confirm Kirkman's unsupported assertion that the data appeared to have had little effect on share prices. Here intervals of approximately one month, two months and six months were used to examine the behaviour of 'market residuals'. As can be seen from Table 1 both tests indicate there was negligible informational content in the data.

The most recently published figures are those of Parker and Gibbs, released in April 1974. Only one period was examined with this data, the 'market residuals' being calculated one month after publication. However, the bench mark date for calculating price movements was taken seven weeks prior to publication to allow for 'leakage' of information in the City.

On this occasion both tests indicate the market if anything has acted in the opposite direction to that one might expect. The API coefficient suggests that

²⁴This date was chosen as the base to cover the possibility of leakages of information prior to publication. The two week lapse following official publication should have been sufficient time for the market to react – as is noted in footnote 15, three newspapers reported the results on March 4th and 5th.

TABLE 1
Test statistics on 'market residual' data

Approx. time since publication (months)	Data source	No. of companies	Sign test null hypothesis χ^2 statistic	API (£)
0.5	Cutler-Westwick	136	1.441*	-0.008
0.5	Cutler-Westwick: earnings errors over 30%	65	4.446*	-0.020
1.0	earnings errors over 30%	65	1.246*	-0.010
5.0	earnings errors over 30%	65	1.862	-0.002
11.0	earnings errors over 30%	65	3.462	+0.024
1.0	Cutler: earnings errors over 20%	59	0.017	+0.008
2.0	earnings errors over 20%	59	0.831	+0.022
6.0	earnings errors over 20%	59	0.424	+0.020
1.0	Parker and Gibbs: earnings errors over 30%	53	11.792*	-0.077

*Majority of sign movements in opposite direction to that expected.

TABLE 2
Test statistics on 'industry residual' data

Approx. time since publication (months)	Data source	No. of companies	Sign test null hypothesis χ^2 statistic	API (£)
0.5	Cutler-Westwick	136	0.029	+0.003
0.5	Cutler-Westwick: earning errors over 30%	65	0.385*	0.000
1.0	earning errors over 30%	65	0.015*	+0.004
5.0	earning errors over 30%	65	4.446	+0.007
11.0	earning errors over 30%	65	0.754	-0.002

*Majority of sign movements in opposite direction to that expected.

Percentage points of the chi-square distribution at one degree of freedom are as follows:

Probability factor	0.25	χ^2 statistic	1.323
	0.10		2.706
	0.05		3.841
	0.025		5.024
	0.001		10.827

i.e. values in the tables for χ^2 below 3.841 indicate the null hypothesis cannot be denied.

a strategy based on the information would over the period have produced a loss almost 8p in the £ greater than if a market average portfolio had been selected. Similarly, for the sign test the chi-square statistic (which in all other instances is significant or nearly so at the 95 per cent probability level) does not sustain the null hypothesis that the direction of the residual price movements could have arisen by chance. However, this hardly suggests that the market has used the data since some two thirds of the price changes were in the *opposite* direction to that which might have been expected.

A possible explanation could in fact be that companies which do well under inflation accounting tend to be heavy borrowers benefiting from the recognition of monetary holding gains. In the uncertain economic conditions prevalent in the period in question these very same concerns tended to suffer most from doubts about corporate solvency.

As a final point it should be noted that the returns for individual securities in this study have been calculated simply as the change in share prices, adjusted where appropriate for rights and bonus issues, but ignoring dividend income. The omission of the latter is justified on the grounds that in taking the market factor out of the data one should also have abstracted from the effect of dividend policies on share prices, since the FT all-share index will itself contain an element representing the market's discounted value of expected distributions for its component firms. Thus if it is assumed that the groups of companies whose share prices have been the subject of study have similar dividend policies and on average declare dividends at the same times as the market index population, it is only necessary to examine residual price movements.

It should also be recognised, of course, that the inclusion of dividends would almost certainly further weaken the case for arguing that the Phillips and Drew figures have had some impact on the market. In each set of data tested over three-quarters of the historic earnings figures were greater than their inflation-adjusted counterparts, so there is a strong likelihood that the positive API coefficients would be reduced and the negative ones increased.

II The case for current cost income statements²⁵

Readers may be surprised that the market appears to respond so little to the information disclosed in inflation adjusted statements, and may even believe it refutes the efficient markets hypothesis. This, however, it does not do for reasons already given. Firstly, there is some evidence that the market has

ACCOUNTING AND BUSINESS RESEARCH

already adjusted for the effects of inflation at the industry level; and, secondly, the market may not at present regard the more detailed company information as being relevant when setting share prices.

In taking this latter view, in fact, who is to say the market is wrong? Certainly not the accountancy profession, which has done little enough to determine whether general indexed data are of any value to investors; and which, together with the CBI, seems more intent on trying to get the income tax burden shifted away from the corporate sector. Moreover, as some writers have observed, it may well be that no accounting figures reporting on *past* events can be very helpful as predictors of the future, except where bankruptcy is impending.²⁶

This, however, seems to be too pessimistic a view. It should in fact be possible to identify the *type* of information which is most likely to prove helpful to investors. On this basis it seems fairly clear that two factors above all interest analysts: firstly, they would like to isolate any recurrent element in a firm's profits; and, secondly, they would like to be able to compare the performances of companies against each other.

Fortunately there is a type of income measure which provides economically meaningful information of this kind, and this is produced by current cost accounting.²⁷ Under this method of income calculation all firms in a particular period charge against their operating revenues depreciation based on the current purchase cost of an asset. So long as the method of depreciation adopted measures fairly accurately the incidence of capital consumption,²⁸

²⁵The term 'current cost income' has been used here to refer to the fully adjusted 'real business profit' concept developed by E. O. Edwards and P. W. Bell, *op. cit.* Succinct summaries of the Edwards and Bell type arguments are given by P. W. Bell, 'Price Changes and Income Measurement', in 'Readings in the Concept and Measurement of Income', ed. R. H. Parker and G. C. Harcourt, Cambridge University Press, London: 1969; by R. H. Parker and G. C. Harcourt in their 'Introduction' to the 'Readings' just referred to; and by L. R. Amey and D. A. Egginton, 'Management Accounting: A Conceptual Approach', Longman, London: 1973, chapter 3.

²⁶e.g. M. N. Greenball, 'The Predictive-Ability Criterion: Its Relevance in Evaluating Accounting Data', *Abacus*, 1971; K. V. Peasnell, 'The Usefulness of Accounting Information to Investors', International Centre for Research in Accounting: Occasional Paper No. 1, Lancaster: 1973.

²⁷The importance of current cost accounting as a means of producing an income figure which measures performance is clearly and strongly emphasised in L. R. Amey and D. A. Egginton, *op. cit.*, chapter 3.6. See also D. A. Egginton and R. C. Morris, *op. cit.*

²⁸Conceptually this is probably best achieved in this context using so-called 'equivalent replacement cost' depreciation. Once again the clearest and best exposition seems to be given in L. R. Amey and D. A. Egginton, *op. cit.*, p. 114-118.

firms are put on a common footing, and it should thus be possible to make reasonable comparisons of their operating performances in a particular period.

Unless current costs are used, of course, the figures become distorted, since long-lived assets are purchased by companies at different times. By using current costs a firm which has just purchased a particular asset should charge depreciation against operating revenues on exactly the same underlying basis as one which purchased a similar asset some years earlier when its *relative* price was different. The value thus placed on each unit of service potential consumed should in fact be the same in a given period for all business with similar types of assets. Any advantage or disadvantage a company receives by buying the asset earlier in time is quite reasonably treated separately as a capital gain or loss incurred at the time when the current cost of that asset changed.

It should therefore be clear that for a particular period the current operating profits of similar businesses should be comparable under a full current cost accounting system. Moreover, where firms separate out their capital (or more specifically 'holding') gains in this way, the *recurrent* trading element of their activities is isolated. Presumably over time one might expect this element would be the best base on which to build predictions of future (operating) profits, and this task would be made easier where a breakdown of fixed and variable costs was given. Another advantage of current cost accounting is that some economic meaning can be attached to the values placed on assets shown in the corresponding balance sheets, since they can be interpreted as one set of external opportunity costs. Thus this method of income calculation provides the best hope of producing data which might be helpful to investment analysts.

Unfortunately the point about performance measurement and comparability is too often overlooked, even by experienced investment analysts who do not rebut the extravagant claims of proponents of mere general index adjustments that their historic cost based figures are somehow made comparable over time and as between companies.²⁹ The simple truth is that they are not – and cannot be – so long as 'realizable cost savings' (i.e. holding gains) are not distinguished, but are recognized in an arbitrary manner.

Unhappily the accountancy profession seems unwilling to examine critically the conventional historic cost system of income calculation. The fact that it

appears to be acceptable (and even desirable) at law as a basis for calculating taxable income and for determining the maximum fund out of which dividends can be paid without impairing the position of unsecured creditors does *not* mean the figures meet the needs of investors and others trying to assess the economic performance of firms.

A great deal has been written about current cost accounting over the last 30 years – indeed, one is sorely tempted to say far too much has been written and too little read, understood and digested! Various versions have masqueraded under titles such as 'current value' or (more usually) 'replacement cost' accounting. The former term is hardly appropriate since 'value' is an undefined concept, while the latter is positively misleading and produces some hoary old chestnuts. Current cost accounting in fact really implies *nothing* about the amount that can be distributed as dividends; nor does it imply that assets can be sold at their current purchase costs. Moreover, the question of whether or not a particular asset is going to be replaced is irrelevant in assessing performance; what one really needs for this purpose is a measure of the change in the current (opportunity) cost of an asset in a period.³⁰ For the same reason the rather dubious argument that real capital should be maintained intact by 'capitalizing' holding gains so that a company can replace its existing assets by similar ones without recourse to the capital market is also irrelevant.³¹

The above brief discussion should make it clear that if any supplementary information needs to be published by companies it ought to be an income figure based on current cost calculations. Moreover, in practice it is unrealistic to deal with general and relative price level changes separately. To apply mere general index adjustments means that some holding gains are recognized while others are not.³² (The distinction depends on whether an asset is 'monetary' or 'non-monetary' in nature, of course). This seems illogical. What is surely required is a system whereby both specific and general price level changes are taken into account. There may, of course, be a good deal of argument about how such a system should be implemented, but this should not affect the basic issue. Regrettably in the past academics have all too frequently squabbled over details when what is

²⁹e.g. P. W. Parker and P. M. D. Gibbs, 'Accounting for Inflation – Recent Proposals and their Effects', op. cit., paras. 17 and 18, again fail to rebut the fallacy in the argument.

³⁰Despite the fact that the point is irrelevant if one is trying to measure *performance* it has greatly exercised a number of academics, notably Gynther in various writings.

³²D. A. Egginton and R. C. Morris, op. cit.

²⁹e.g. P. W. Parker and P. M. D. Gibbs, 'Accounting for Inflation – Recent Proposals and their Effects', *Journal of the Institute of Actuaries*, 1974, para. 14.

really needed is a concerted effort to make the profession see the need for the supplementary publication of an income figure, which, by recognizing the impact of unrealized changes in relative prices, differs sharply from that produced by the conventional historic cost system.

III Conclusions

Reasonably accurate inflation adjusted earnings figures for most major quoted companies have now been available to the City for almost three years, but as yet there is very little sign that the market has responded to the information. This partly reflects the fact that the incidence of inflation at an industry level has already been discounted into prices; and it may also indicate a certain distrust of the figures. Since there is little evidence that these disguised historic cost figures are good predictors of future outcomes, such a scepticism has much to commend it. However, it may well yet be that irresistible pressures will be mounted forcing analysts to rush lemming-like into an acceptance of the new figures. Such a development would be regrettable since there

ACCOUNTING AND BUSINESS RESEARCH

are few grounds for believing that such figures are more relevant to either the deliberations of individual investors or to the efficient allocation of resources through the capital market. The latter goal – inasmuch as it can ever be achieved anyway³³ – requires that analysts have a better means of making comparisons of performance between firms and of predicting more accurately future outcomes. In practice, as has been argued elsewhere,³⁴ it seems the crystal-ball gazing required to make any capital market system work effectively is only reasonably accurate in predicting marginal profit levels for periods of up to about a year. However, on *a priori* grounds there seems to be a strong case for publishing a fully indexed set of supplementary accounts incorporating current cost principles since such a method of calculating income offers investors the best chance of making meaningful comparisons between companies and of improving their predictive abilities.

³³See R. C. Morris, op. cit., ch. IV.

³⁴Ibid., p. 60–64.

A Further Comment on Asset Values and Income Measurement

S. J. Gray and M. C. Wells

As the worst insult to be suffered by any author is to be ignored, we are gratified by the interest shown in our previous article.¹ The criticisms of Professor Whittington² and Messrs. Macdonald³ and Popoff⁴ are diverse. For convenience, however, we will attempt to meet them here, and at the risk of oversimplification, we have summarised their views in the following tabulation:

- 1 The argument for Net Realisable Value (NRV) as the single method of asset valuation is oversimplified (Whittington), and fruitless (Popoff).
- 2 The argument we used applies only to asset valuation and not to periodic income (Whittington and Macdonald).
- 3 The concept of capital as a fund of purchasing power is less relevant to managers and investors than a concept of productive potential (Macdonald and Popoff).
- 4 Our arguments for NRV are based on a narrow proprietary concept of the business entity, and overlook the interests of other parties (Popoff).
- 5 NRV is inappropriate in a report of stewardship (Popoff).⁵

¹Gray, S. J. and Wells, M. C., 'Asset Values and *Ex Post* Income', *Accounting and Business Research*, Summer 1973, pp. 163-7.

²Whittington, Geoffrey, 'Asset Valuation, Income Measurement and Accounting Income', *Accounting and Business Research*, Spring 1974, pp. 96-101.

³Macdonald, Graeme, 'Deprival Value: Its Use and Abuse', *Accounting and Business Research*, Autumn 1974, pp. 263-269.

⁴Popoff, Boris, 'The Informational Value of Replacement Cost Accounting for External Company Reports', *Accounting and Business Research*, Winter 1974, pp. 61-70.

⁵Popoff also makes a number of other points. However, as these are, in the main, reassertions of the points made by Parker, R. and Harcourt, G. C., (*Readings in the Concept and Measurement of Income*, Cambridge, Cambridge University Press, 1969) which were the subject of our original article, there is nothing to be gained by resurrecting them here.

Despite these criticisms, there appears to be no disagreement with the assumed objectives of financial statements. Those stated by Parker and Harcourt,⁶ and accepted by us, were the provision of information of the income and financial position of the entity which is useful for (i) decision-making, (ii) planning and control, and (iii) as a report of stewardship. It should be noted, however, that Macdonald argues only in respect of the assumed need of investors to choose between alternative investments.⁷

With the three purposes of financial statements in mind, we shall deal with each of the points of criticism in turn.

1. Asset valuation

While Macdonald supports⁸ our view that NRV is the appropriate measure of assets for inclusion in a statement of financial position, Whittington considers us to be 'entirely misguided'. He states that 'a single value in isolation provides no standard of comparison and therefore no means of evaluating alternative courses of action' (p. 96). But our argument was that the net realisable value (NRV) of an asset is a part of every evaluation of past performance and every determination of future action.⁹ It is as we said a 'necessary part of the information for decision-making by managers or investors' (p. 167). It is not, and we

⁶Parker and Harcourt, *Readings*, pp. 4-5.

⁷'Deprival Value', p. 264.

⁸'Deprival Value', p. 269.

⁹We cannot conceive of an entity having more than one financial position at a given point of time just as we cannot conceive of an object having more than one length or weight or travelling at more than one speed at a given place and moment of time. We have not therefore pursued Whittington's suggestion (p. 101) that the financial statements should contain 'information relevant to the assessment of the various valuations...'. It is, of course, open to directors to add such explanations or justifications as they wish within their report, or by way of note. But the statements of income and financial position should, we feel, be left intact.

did not claim that it is sufficient for that purpose. On the contrary, we stated quite clearly that decisions concerning an *existing* asset held by the firm 'will be determined primarily by the relationship between the present value of the existing asset and the use which can be made of the funds released by its sale' (p. 166). There is, in this context, no such thing as a *standard* of comparison; decisions are made on the basis of comparisons between *alternative* opportunities.

What we claimed, in short, was that as NRV is a necessary but not sufficient part of the information for every non-trivial decision affecting the assets of a firm, it is the most widely useful measure of those assets. We cannot think of an example, and none of our critics has cited one, in which NRV is not useful. The same may, of course, be claimed for net present value (PV). But as the conditions of objectivity and verifiability are commonly regarded as necessary attributes of information for external dissemination, and as NRV satisfies those conditions, it has a stronger claim than alternative measures or values to be used as the basis of financial reports of a company's present position. In supporting that claim, we do not deny that both expectations (like PV) and experiences (like NRV) are necessary elements in the decision-making process. It is the failure to distinguish their respective roles which causes the confusion in arguments about and the practice of financial reporting.¹⁰ (It should also be noted that, despite claims as to their objectivity, conventional balance sheets which include such things as bad debts and depreciation provisions also mix up experienced costs and expected events). Our focus has been on the problem of an appropriate measure of achievement, not a statement of expectations.

We must also dispute Popoff's statement that valuation of all assets on the basis of net realisable value would imply that the only course of action being contemplated by management is the more or less immediate realisation of assets.¹¹ As we have pointed out above, NRV is relevant to all significant financial decisions. It is indicative of the opportunity of disinvesting, or the cost of retaining the asset. Further, it is a measure which is relevant to the calculation of income, just as a measure of time is relevant to the calculation of speed. Both speed and income represent relationships: of a moving object and a fixed point, and of an entity and the market place, respectively; they relate to a specific place and

ACCOUNTING AND BUSINESS RESEARCH

a specific lapse of time; they are relevant to an evaluation of performance of, say, a car and management, respectively; they are relevant to the planning of, say, a journey and financial operations, respectively; and they are *generally relevant* to decisions involving the future actions of the car's driver or owner and the future actions of the entity's managers or investors respectively.

We reject, therefore, the charge that 'the recording of net realisable values alone pre-empts the "sell" decision just as replacement cost pre-empts the "replace" decision' (Whittington, p. 96). We claimed that the use of replacement cost presumed replacement, because that is the only alternative to which replacement prices are relevant, NRV, on the other hand, is relevant to *all* alternative courses of action; so no particular course of action can be presumed.

An asset may, of course, be retained because the PV of using it exceeds its NRV. That decision cannot be made without knowledge of NRV, yet the decision to sell has certainly not been pre-empted, nor even made! It is because NRV is common to all decisions that it is the *only* measure which does not pre-empt a decision.

Whittington (p. 96) and Popoff (p. 64) also criticise the use of NRV because liquidations are 'relatively rare'. But, according to our observations (which are clearly at odds with Popoff's) trading in assets is commonplace. Firms buy, sell and replace individual assets. They also pledge them as security against loans. But more importantly, as we stated on page 167, the notion of NRV used by us (and adopted from Chambers¹²) is the approximate amount of cash currently realisable in the ordinary course of business in the markets in which the firm conventionally deals. Any connotation of forced liquidation, as suggested by our critics, is therefore quite misleading.

Whittington further criticises us for dismissing too lightly the situation where $PV > NRV > RC$.¹³ We described this as an unlikely situation, caused by a market distortion. But likely or unlikely, our argument stands nevertheless; RC has no relevance to decisions concerning the *existing* assets held by the firm because it relates, by definition, to goods which the firm does not hold. We do not dispute Whittington's contention that RC is relevant to the replacement decision. That much is obvious. The point is that NRV is also, and always, relevant. It is its *general* relevance which makes it appropriate as the basis of financial reporting.

¹⁰Similar views are the basis of A. D. Barton's 'Expectations and Achievements in Income Theory', *The Accounting Review*, October 1974, pp. 664-81.

¹¹'Informational Value' p. 64 Whittington makes a similar statement (p. 96).

¹²Chambers, Raymond J., *Accounting, Evaluation and Economic Behavior*, Prentice-Hall, 1966, p. 204.

¹³RC is defined by Whittington as 'the cost of replacing the service to which the asset relates' (p. 97).

2. Income measurement

Macdonald is correct in his statement that 'not until their conclusion do the authors explicitly identify the concept of income they have in mind' (p. 263). But what he does not point out is that it was implicit in our earlier discussion of the three purposes of financial reports. Forecasting and planning must be founded upon our experience of the past (what other experience have we?); control requires that expected performance be compared with experienced performance; and stewardship reports should, as Whittington points out, enable a check on competence as well as honesty (p. 99).

A statement of *ex post* income, where it measures the change in financial position (wealth) of the firm, will contain the information required for each of the purposes listed above.¹⁴ For that reason, we stated:

In summary, what we are suggesting is that a statement purporting to contain a measure of *ex post* income should relate to the actions that were taken and the state of the property in possession as at the stipulated date, not to actions which someone expects to take, or the state of some property other than that in possession at that date (p. 165).

We do not deny the importance of historic information, as Whittington terms it (p. 99). Records of all transactions entered into are essential. But that statement does not go far enough. It overlooks the advantage of stipulating a method of calculating income which is, in part at least, dependent upon the method used for measuring assets. That dependence is discussed below. The fact that it was assumed by us explains our concern with the alternative methods available for measuring assets.

There is one further point which requires elaboration. Because the focus of our previous paper was on asset measures, we considered only the problem of accounting for the effects of changes in the prices of specific assets. Accounting for the effects of changes in the general price level (that is, inflation) was not, therefore, discussed. However, as our critics have enlarged the argument, it is appropriate to point out that where a part of the purchasing power available to the firm at the beginning of the period has subsequently been lost (or gained) through changes in the value of the currency, that loss (or gain) ought to be accounted for in the calculation of income. Following Chambers, we propose a 'capital main-

¹⁴We are not suggesting that the resultant single figure will, by itself, be sufficient for the purposes indicated. Obviously, some detailed breakdown of the expenses, revenues, losses and gains will be necessary. But the net result will be the summation of all of those factors - the net change in wealth.

ance adjustment' which ensures that the statement of 'capital' at the beginning and end of the period is representative of the same amount of purchasing power, irrespective of changes in the value of the monetary unit.¹⁵

Notice that our notion of income has several points in its favour which cannot be claimed by the proponents of alternative notions. First, as the calculation of income is based on the change in financial position, the calculation of income and of financial position are completely and logically inter-dependent. Second, because it is in respect of what has happened and not what might have happened (if, for example, we had been deprived of or had replaced an asset) the calculation of income or components of it are directly relevant to each of the three stated purposes. Third, as it is an all inclusive concept which incorporates holding as well as trading gains and losses, it is readily comprehensible to layman and expert alike. Fourth, it is quite independent of any party's future intentions or expectations. We fail to see how a report of stewardship based on the stewards' future intentions can be of any use; it is akin to awarding goals in a game of football because it is the team's intention to score goals in its next game.¹⁶

3. Productive potential

Macdonald argues for a measure of income which is independent of the firm's financial position, but which is dependent on the deprival value of assets. The purpose to be served by measuring income in this way is 'to enable investors to choose between alternative investments' (p. 264). That choice will, presumably, be made on the basis of a comparison between the measures of income and wealth of firms regarded as alternative investment opportunities. For this purpose wealth is defined as a fund of purchasing power, for as Macdonald points out, it is indicative of the firm's capacity to adapt (and therefore to survive and prosper). In accordance with this view, we defined income as a change in wealth. It therefore provides an explanation, in as much detail as is deemed necessary, of the change in the stock of wealth since some previous point in time. If the calculation of income is independent of the calculation of wealth, then that explanation is not available.

¹⁵See Chambers, *Accounting, Evaluation . . .*, pp. 258-9.

¹⁶A recent article in this journal, 'The Enterprise Value Concept of Asset Valuation' by C. J. Warrell (Summer 1974, pp. 220-226) is, perhaps, an extreme case of this proposal. Warrell states: 'But as the reports constitute a report by management to shareholders and others, it is submitted that it must be management's intentions with respect to the assets which are used to determine the valuation basis' (p. 222).

Macdonald cites Hicks¹⁷ in support of his notion of income, and for this purpose defines capital as 'a fund of productive power' (p. 265). Net income is the cash inflow from production received during a specified period after sufficient has been set aside to maintain productive potential. This argument contains two basic flaws:

(1) Capital is divorced from wealth in a way which is not apparent in Hicks' exposition. As capital is a fund of productive potential (according to Macdonald), and wealth is a fund of purchasing power, there can be no connection between the two (although Macdonald's reference to cash flows suggest that purchasing power, in the form of cash, is an essential element of income). As we have stated above, the lack of any obvious connection renders the income figure proposed by Macdonald useless as a basis of predicting future changes in wealth.

(2) 'Productive potential' is a physical notion based on 'available knowledge' (p. 265) which has no economic counterpart. The example given by Macdonald (pp. 265-6) is in respect of a *machine* which is expected to produce a standard output evenly over three years. At the end of each period the productive potential is assessed, and the 'depreciation' calculated. Against our charge that this procedure assumes that a company will go on doing in the future what it has done in the past, Macdonald claims that that is what his proposal 'does not achieve' (p. 267, his emphasis). The opportunity to do so is available if this is company policy (p. 267, his emphasis). The company may choose to invest an amount equivalent to the depreciation in any way it sees fit.

But what of the 'capital'? The amount of depreciation is dependent on the valuation of capital, which is dependent on the notion of productive potential. That valuation can only be made by assuming not only that the asset will be used to produce a specified output (the physical notion) but also by predicting future demand, costs and prices (the economic notion). It may be possible to assess a machine's physical capability of producing a certain output; but to translate that into economic terms requires the prediction of a vast array of variables which cannot be classed as 'available knowledge'. By concentrating on the investment opportunities for the funds retained for depreciation, Macdonald begs the question of the assumptions to be made in valuing the capital.

We do not deny that investors may wish to be informed of managers' intentions. But unless the

investors have knowledge of the present wealth (purchasing power) of the company, and an explanation (through the income calculation) of recent changes in wealth, they have no basis upon which to assess the viability of those intentions. Similarly, after the event, they have no basis upon which to evaluate the success with which previous intentions were carried out. Financial reports, to be useful to investors, must distinguish clearly between present facts or achievements and future intentions or expectations.

4. A Proprietary concept?

Popoff's claim that our (and of course Chambers') proposals are based on 'a narrow proprietary concept of the business enterprise' (p. 62) is, perhaps, the most astonishing yet made with respect to a system of accounting involving the use of NRVs or current cash equivalents. We do not, as Popoff suggests, 'pretend' that business enterprises 'operate in an assumed isolation from the socio-economic environment' (p. 63). On the contrary, we have been at pains to propose and discuss an accounting system which is relevant to the diverse needs of all interested parties, yet which curries favour for none. The outstanding characteristics of a system based on NRVs are its objectivity (being based entirely on external evidence), its neutrality (being independent of *any* interested party) and its general relevance (because it is based on a notion of general purchasing power)!

Simplistic notions of proprietary or entity theories (narrow or otherwise) are simply beside the point. We have advocated a system based on the NRVs of assets and the face values of liabilities because that system recognises the full legal and economic position of the firm as it was at the stated date, in respect of the things it owned, the amounts it owed, and the markets in which it operates.

5. Stewardship

Popoff suggests that 'the reports should reflect, in effective economic terms, the economic resources of the firm at balance date - being the economic resources bequeathed to the new period' (p. 62). We concur. That is precisely what the system based on NRVs does. Because the NRVs of the assets represent the purchasing power available to the management at the beginning, and subsequently at the end, of a period, they are the only measures which reflect in effective economic terms the resources bequeathed from one period to the next. The RC of the assets indicates the amount of funds which would be required to obtain those assets if the firm did not already have them. The RC of an asset may be useful, as Bonbright has pointed

¹⁷Hicks, J. R., *Value and Capital*, Oxford University Press, 1953 (reprint).

out,¹⁸ as an indication of how much it would cost to restore the owner to his original position if he were suddenly and unwittingly deprived of that asset. It does not, nor can it, provide an indication of the resources currently at the disposal of the owner — that is, the current purchasing power which the owner can use as he sees fit, in production or in the market place.

If, as Whittington has suggested, the object of a stewardship report is to enable a check on competence as well as honesty, then investors may wish to see the extent to which the stewards (managers) through their actions or inaction added to or depleted the stock of resources. This requires no assumption as to the 'purpose of the business activity carried out by the steward' (Popoff, p. 65). It requires only a straightforward statement of the facts as determined in the market and confirmed by qualified observers.¹⁹ The investor can then judge for himself whether the results matched his expectations, and act accordingly.

Even if an assumption as to purpose is made, will RC satisfy the requirements of a stewardship report? We have referred above to the difficulties of determining an economic indicator of production potential (or in Popoff's terms 'production capabilities') and of basing a stewardship report on the steward's intentions. There are other difficulties. Is the report to be based on the RCs of specific assets or, as

Whittington would prefer, their services? The former takes no account of obsolescence, the latter takes no account of the interdependence of one asset on others. In either event the resultant report would fall short of a report on competence because it can give an indication only of the cost advantage or disadvantage of purchasing the asset at some prior time, and not whether it should have been bought at all. NRV, on the other hand, provides an indication of the purchasing power lost or gained through possessing the asset, against which can be judged the wisdom of having used, and continuing to use, the asset.

Conclusion

We concur with Whittington that practical difficulties of estimation or measurement should not intrude on theoretical arguments for the use of alternative accounting methods. We have tried to build a case on theoretical grounds for the use of net resale prices as the measure of a firm's assets to be included in financial reports and as the basis of the calculation of *ex post* income. It is also interesting to note that this proposal enjoys a large body of support in current reporting practices. Companies already must obtain the resale price of their inventories if they are to use the 'cost or market' rule for stock valuation. They are also required to obtain and report the current market value of marketable securities held. Furthermore, the market value of land and buildings must be reported where this is substantially different from acquisition costs.

Our claim is that current resale prices enjoy three unique advantages over competing alternatives for inclusion in statements of *ex post* financial position and performance: 1, those prices are generally relevant; 2, they are neutral as to intention; and 3, they are objective and thus verifiable. As these grounds have not been refuted, we hold fast to the position stated in our previous paper.

¹⁸Bonbright, James C., *The Valuation of Property*. The Michie Co., 1965 (reprint). For a comment on Bonbright see Chambers, R. J., 'Value to the Owner', *Abacus*, Vol. 7, June 1971, pp. 63-70.

¹⁹Note that our use of the term 'market' has broad application to all types of markets (perfect, oligopolistic, monopolistic) and includes those where prices are fixed by government intervention. The point is that, irrespective of the market structure, that is the place wherein the firm may trade in assets. It is the existing set of prices which is our concern, not how they happened to be set.

Reporting Business Performance

John Arnold and Anthony Hope

Introduction

In a recent paper in *Accounting and Business Research*,¹ Bryan Carsberg, Anthony Hope and R. W. Scapens stressed the importance of specifying the objectives of published accounting reports as a first stage in developing a theoretical framework for accounting. Their paper reported work undertaken in the initial stage of a long-term research project in progress at the University of Manchester.² The aim of the overall project is to assess the usefulness of different methods of recording and reporting business transactions. The purpose of this paper is to outline a research framework that might be used in choosing between competing methods of reporting business performance according to their usefulness.

A number of the ideas we discuss have been the subject of debate in the literature, and interested readers may wish to follow up the references we provide. However, the issues have generally been debated in isolation and, as far as we know, there is no published work which attempts to integrate them into a framework for empirical research. This represents a significant gap in the literature, and one that we attempt to fill in this paper.

A Framework for Research

Some disagreement exists in the literature as to whether accounting problems may be tackled 'scientifically'.³ The essence of scientific method is that hypotheses are advanced, normally based on *a priori* arguments, and tested empirically. Our view

is that the area of accounting study concerned with reporting business performance is susceptible to scientific treatment: hypotheses may be made about the relative usefulness of competing methods and tested by real world observation or simulated experiments.⁴ Failure to undertake empirical testing, where it is feasible, is likely to lead to a further proliferation of competing accounting theories, between which there is little prospect of choice. Thus, the framework that we suggest includes the empirical testing of alternative methods of reporting business performance. The framework is shown diagrammatically in Figure 1.

(a) *Specification of objectives:* The importance of establishing objectives as the first step in constructing any information system may appear to be obvious; few of us would consider planning a route for a journey without having made at least a tentative decision about our destination. And yet the accounting literature includes many recommendations of accounting theory and practice without an explicit statement of the purposes to be served by such recommendations.

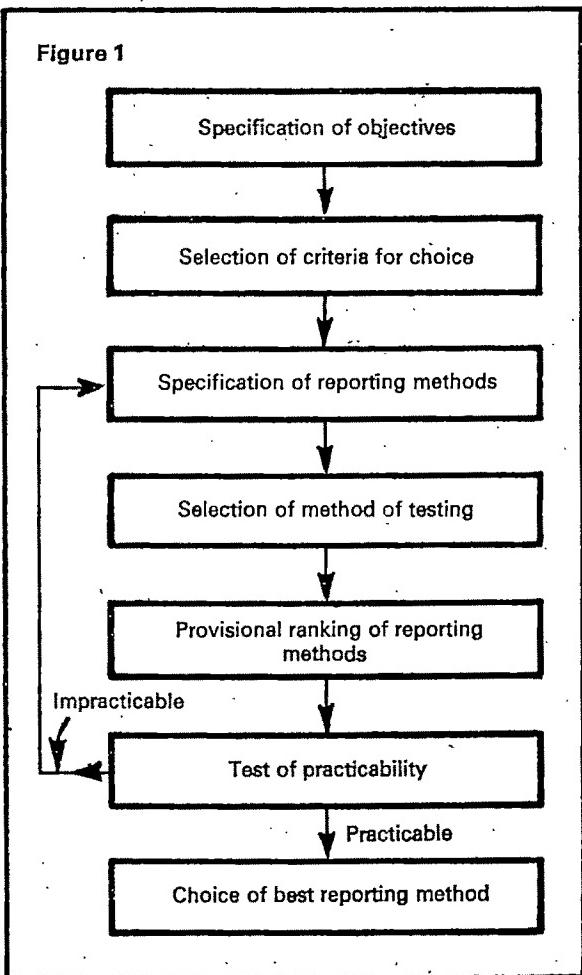
(b) *Selection of criteria for choice:* The selection of criteria, against which various methods of reporting may be assessed, depends on the objectives specified for financial statements. More precisely, the choice

¹Bryan Carsberg, Anthony Hope, and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, Summer 1974.

²The present organisers of the project are Bryan Carsberg, John Arnold, Anthony Hope and R. W. Scapens.

³For an assessment of the relevant literature, see Ian Tilley, 'Accounting as a Scientific Endeavour: Some Questions the American Theorists tend to leave unanswered', *Accounting and Business Research*, Autumn 1972.

⁴Support for this view, and more detailed discussions of the development of accounting theory and the application of scientific method may be found in: R. R. Sterling, 'On Theory Construction and Verification', *The Accounting Review*, July 1970; R. Mattessich, 'Methodical Preconditions and Problems of a General Theory of Accounting', *The Accounting Review*, July 1972; N. J. Gonedes, 'Efficient Capital Markets and External Accounting', *The Accounting Review*, January 1972; R. R. Sterling, 'Decision Oriented Financial Accounting', *Accounting and Business Research*, Summer 1972; and L. Revsine, *Replacement Cost Accounting* (Prentice-Hall 1973), Chapter 1. For a different view, see E. Stamp, 'Accounting Theory and Research', in *Facing the Future* (Haymarket Publishing, 1972).



should reflect the informational needs of those who will use the statements. These informational needs might be determined by empirical investigation. For reasons that we shall discuss later, a normative statement of needs, deduced from the assumed behaviour of statement users, may be more appropriate at present.

(c) *Specification of reporting methods:* The reporting methods to be tested may be selected either because they are widely applied at present or on the grounds of an *a priori* assessment of their usefulness. In view of the lack of a consensus amongst accounting writers of the best methods, *a priori*, we shall use both methods of selection.

(d) *Selection of method of testing:* The reporting methods selected may be tested in one (or both) of two ways. The first would involve the application of the various reporting methods to real world business performance data to assess the success of each method in satisfying the chosen criteria. Under the second method of testing, the reporting methods would be applied to a number of sets of hypothetical business transactions and environmental conditions and would again be assessed according

to their ability to satisfy the chosen criteria. This second method of testing is generally known as simulation.

(e) *Provisional ranking of reporting methods:* The next stage is to use the chosen method of testing to rank the reporting methods according to their ability to satisfy the criteria selected. At this stage the ranking is provisional; before a firm recommendation is made, the practicability of the reporting methods must be examined.

(f) *Test of practicability:* The practicability test involves an assessment of both the feasibility and the cost of implementing the various methods. If a particular method is impracticable, because it requires the use of data which are unavailable or available only at a cost much greater than any likely benefits, the reporting methods to be tested must be re-specified to exclude those data.

(g) *Choice of best reporting method:* Strictly, the final ranking of reporting methods is a problem of economic choice; the benefits (i.e. the value of information provided to users) and costs of all feasible methods are compared, and the method with the largest surplus of benefits over costs is chosen. In practice, a precise statement of benefits and costs may prove extremely difficult. Nevertheless we feel that an approximate calculation along these lines is preferable to an exact statement of less relevant criteria.

In the remainder of this paper we shall review the work already undertaken on the specification of objectives, and discuss the other stages of the proposed research framework. We shall also describe an 'ideal' method of reporting business performance, and explain our reasons for believing that it will not be implemented in the near future and that it is consequently necessary to seek a proximate method.

Specification of Objectives

The work of Carsberg, Hope and Scapens responded to a significant need of accounting theorists. The importance of specifying objectives, as the first stage in constructing an accounting theory for reporting business performance, is stressed by a number of eminent accounting theorists. For example, Sterling writes, 'The problem is not so much that there are conflicting theories about the same subject matter as it is that the various theories are concerned with different subject matters.'⁶ Edey suggests that 'Profit calculation is not based on a law of nature. It is a human activity, carried out for a human purpose. The method used, and the kind of

⁶R. R. Sterling, 'On Theory Construction and Verification', op. cit., p. 449.

assumptions on which the calculation is based, should be determined by the end desired. The first step in a discussion of the bases of profit calculation is, therefore, to ask why the measurement is wanted.⁸ Finally, and perhaps most forcibly, the point is made by Mattessich who writes, '*The heart of the problem might rest in the difficulty to formulate specific well-defined purposes and to match them to a specific set of hypotheses.*'⁹

Carsberg, Hope and Scapens highlighted the need for an explicit statement of objectives, and suggested a preliminary list of nine objectives that published accounting reports might be required to satisfy.¹⁰ It is possible that different information, and a different reporting method, will be optimal for each of these objectives. The choice of criteria for assessing the usefulness of different reporting methods depends on the particular objective assumed for the accounting report. Conclusions on the usefulness of particular methods will relate only to the assumed objective.

The questionnaire survey undertaken by Carsberg, Hope and Scapens suggests that no one objective clearly dominates all others.¹¹ However, it does provide an indication that some objectives are thought to be more important than others, and thus more worthy of urgent attention.¹² In the absence of a clear consensus of opinion in favour of any of the possible objectives, and given the need to specify one within our suggested framework, we propose to limit our research study initially to a single objective, regarded as important by the respondents to the questionnaire. As an initial specification we shall take the first objective listed by Carsberg, Hope and Scapens: 'The provision of information to shareholders (actual and potential) to guide their investment decisions, i.e. decisions on whether to buy, hold or sell securities.'¹³ Any conclusions that we eventually reach will relate *only to this objective*. Separate studies will be necessary to test the ability of reporting methods to satisfy other objectives.

⁸H. C. Edey, 'The Nature of Profit', *Accounting and Business Research*, Winter 1970, p. 50.

⁹R. Mattessich, op. cit., pp. 478-479 (italics in original).

¹⁰Bryan Carsberg, Anthony Hope, and R. W. Scapens, op. cit., p. 166.

¹¹The questionnaire was sent to a sample of 600 members of British professional accountancy bodies, from whom 121 usable replies were received. As Carsberg, Hope and Scapens point out, the method of selecting the sample and the low response mean that it would be dangerous to generalise from the analysis of the replies.

¹²Bryan Carsberg, Anthony Hope, and R. W. Scapens, op. cit., p. 171.

¹³Bryan Carsberg, Anthony Hope, and R. W. Scapens, op. cit., p. 166.

Informational Needs of Shareholders

Our choice of the objective of providing shareholders with information to guide their investment decisions leads us to ask what sort of information is likely to be of most relevance and utility for this purpose.¹⁴ The question may be answered either empirically (by asking shareholders what information they require) or normatively (by deducing their requirements from normative decision theories). At first sight, the former approach seems more appealing; it is democratic and direct. However, the implementation of such an empirical investigation is far from easy. Shareholders' responses are likely to be conditioned by the sort of information they are receiving at present and have been accustomed to receive in the past.¹⁵ A reliable empirical test would probably involve providing shareholders with a wide range of information (very much more than they receive at present) for a number of years before asking them which information they would value most in the future. Such a test would require extensive co-operation from a substantial number of companies and we would be ingenuous to regard it as feasible in the near future.

A variant of the empirical approach would involve statistical studies of the relationship between the value of a shareholder's investment and various types of available information. Such an approach would have the advantage of avoiding the difficulty that shareholders may have little insight into their own decision processes. It would, however, provide information only about the usefulness of data which are currently available. In consequence, we rule out an empirical approach, for the time being, and adopt a normative approach. We make use of the familiar (normative) net present value decision model.

For an application to shareholder investment decisions, the model may be stated formally as follows:

$$V_0 = \sum_{j=1}^n \frac{d_j}{\prod_{t=1}^j (1+i_t)} \quad (1)$$

where V_0 is the current value of a shareholding as

¹⁴For discussions of the nature of relevance and utility in accounting theory see, for example, K. Shwayder, 'Relevance', *Journal of Accounting Research*, Spring 1968; and T. A. Lee, 'Utility and Relevance - the Search for Reliable Financial Accounting Information', *Accounting and Business Research*, Summer 1971.

¹⁵For an allegory see R. R. Sterling, 'A Statement of Basic Accounting Theory: A Review Article', *Journal of Accounting Research*, Spring 1967, p. 106.

estimated by an investor,¹⁴ d_t is the receipt expected from the investment at time t , i_t is the appropriate discount rate for period t , and n is the last time at which a receipt is expected from the shareholding (i.e. the date of sale or liquidation).

We assume that a shareholder wishes to maximise the present satisfaction he enjoys from the prospect of the future receipts he expects from his whole portfolio of investments. In this context, the above valuation model is purely formal. To give the model operational usefulness, we must consider explicitly the impact of risk.¹⁵

It has been argued that, if capital markets are efficient, the return expected from any one investment in a particular period will depend on the return available on a riskless security, the covariance of the expected return of the investment with that of an efficient market portfolio, the expected return on the market portfolio and the variance of the expected return on the market portfolio.¹⁶ Applied to a particular investment, the model is as follows:

$$E(R_{at}) = R_{ft} + \left(\frac{\text{Covariance}(R_{at}, R_{mt})}{\text{Variance}(R_{mt})} \right) \times (E(R_{mt}) - R_{ft}) \quad (2)$$

where $E(R_{at})$ is the return expected from investment A during period t ,¹⁷ R_{ft} is the return available on a riskless security during period t , and $E(R_{mt})$ is the return expected on the market portfolio during period t .

The return expected from an investment (i.e.

¹⁴In deciding whether to increase, decrease or hold constant his holding in the investment, the investor will compare his estimate of the current value of the shareholding (V_0) with its current market value. If V_0 is greater than the current market value he will increase his holding, and so on.

¹⁵The remainder of this section contains a simplified (but unavoidably mathematical) exposition of the role of portfolio analysis in assessing the risk of an investment opportunity. It is our opinion that the problem of risk is so fundamental to investment decisions that its existence should not merely be noted, without further analysis, as sometimes happens in the initial formulation of an accounting research proposal.

¹⁶See, for example, H. Markowitz, 'Portfolio Selection', *The Journal of Finance*, March 1952; and W. F. Sharpe, 'Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk', *The Journal of Finance*, September 1964.

¹⁷The return on security X during period t is defined as follows:

$$R_{xt} = \frac{V_{xt} - V_{xt-1} + d_{xt}}{V_{xt-1}}$$

where V_{xt} and V_{xt-1} are the values of the security at the end and beginning of period t respectively, and d_{xt} is the dividend paid on the security during period t , assumed, for convenience, to be paid at the end of the period.

required by investors) is equal to the return on a risk-free security plus an adjustment factor which depends on the correlation between the returns expected on the investment and those expected from the market as a whole. If the investment is positively correlated with the market (i.e. if it does well when the market does well) the return required is higher than the return available on the riskless security, because the investment is a poor hedge against risk. If it is negatively correlated with the market, the return required is lower than the risk-free return – the investment offers a hedge against risk.

Strictly, the portfolio model is applied to each period independently. Thus the expected return required from a particular investment may vary from period to period. The return expected from investment A during period t is defined as follows:¹⁸

$$R_{at} = \frac{V_{at} - V_{at-1} + d_{at}}{V_{at-1}}$$

Rearranging gives:

$$V_{at-1} = \frac{V_{at} + d_{at}}{1 + R_{at}}$$

If R_{at} is the minimum expected return required from an investment in security A during period t , calculated using expression (2), V_{at} is the expected value of the investment in A at the end of period t , and d_{at} is the dividend expected from the investment at the end of period t , it follows that V_{at-1} is the maximum price the investor would be willing to pay for the investment in A at time $t-1$. R_{at} may be regarded as the appropriate discount rate for investment A during period t .

Reverting to expression (1), we may now define i_t in accordance with the portfolio model. i_t is the appropriate discount rate for period t , calculated from expression (2), and representing the minimum return required from the investment during period t . V_0 is the shareholder's estimate of the current value of the investment, i.e. the maximum price he would be willing to pay for the security. The shareholder's investment decision involves a comparison of this value with the current market value of the security. He will buy more shares (if V_0 is greater than the market value of his holding), sell some of those he owns (if V_0 is less than the market value) or hold constant the shares he has (if V_0 equals the market value).

Examination of the assumed decision model allows us to describe the sort of information required by the shareholder from the business in which he is investing. Ideally, he requires estimates of the cash flows he can expect from his investment (primarily the

¹⁸See footnote 17.

dividends to be paid to him) together with estimates of the covariance of those cash flows with the cash flows expected from a market portfolio of investments.¹⁹ These estimates, together with his own estimates of the return on a riskless security and the size and variance of the return on the market portfolio, enable an investor to estimate the value, to him, of a particular security. The investor may satisfy his personal attitudes to risk and time preference by increasing or decreasing his investment in the riskless security.²⁰ If opportunities to invest in a riskless security, and indeed to borrow at the same 'rate of return', do not exist, the operation of the portfolio approach becomes more complex.²¹ However, the principles of the analysis, and the information required by an investor from the firms in which he holds shares, are similar.

In addition to estimates of future cash flows, and their associated relative uncertainty, the shareholder will require information to enable him to monitor the performance of the business through time. Such control information, involving the regular comparison of forecast and actual performance, is an essential part of good internal planning procedures. There is every reason to assume that it is of equal importance to a shareholder who wishes to assess the worthwhileness of his investment.

Thus a shareholder might have two major, inter-dependent informational needs – forecasts of future dividend receipts and regular reports explaining both differences between forecast and actual receipts, and changes in forecasts if expectations have changed.

An 'Ideal' Method of Reporting

An ideal method of reporting would satisfy, as far as possible, the assumed informational needs of shareholders. For the informational needs assumed in the previous section, an ideal system might involve the regular provision by a company of:

- (i) forecasts of the cash flows the company expects in the future, analysed, as appropriate, between different areas of business activity;
- (ii) statements of the dividend policy the company intends to pursue in the future;
- (iii) estimates of the uncertainty attached to forecasted cash flows, described in sufficient detail to enable the shareholder to assess the impact of the uncertainty on his whole portfolio of invest-

¹⁹We shall refer to the covariance subsequently as the 'relative uncertainty' of the future cash flows.

²⁰See W. F. Sharpe, *op. cit.*

²¹Application of the portfolio model is complicated further by the existence of other market imperfections, e.g. transaction and information costs.

ments;²²

- (iv) statements of actual cash flows, with explanations of differences between forecast and actual flows;
- (v) statements of changes in expectations of future cash flows, with explanations of the changes;
- (vi) estimates of the current replacement and realisable values of assets.

Items (i) and (ii) would enable a shareholder to estimate Σd_j in his decision model. Item (iii) would enable him to estimate the appropriate discount rate for each period he holds the investment. Items (iv), (v) and (vi) would enable him to assess management's efficiency in utilising resources and in setting estimates and achieving estimated performance.

Systems similar to the one outlined have been specified in the accounting literature and recommended for adoption in the UK.²³ However, there are a number of frequently stated objections to systems of this sort which must be discussed in considering the feasibility of their implementation.

Objections to the 'Ideal' Method

The criticisms most often levelled against reporting methods such as the one outlined in the previous section, i.e. including cash flow estimates, are listed below, together with our comments on them.

1. *The forecasts would be uncertain.* Uncertainty is never absent from investment decisions, and it is likely to prove more, rather than less, troublesome if ignored. Under the 'ideal' system, shareholders are provided with estimates of uncertainty and details of the factors contributing to it. This information should already form part of management's decision process.
2. *It is difficult to audit uncertain forecasts.* This is generally true, but we note that figures affecting past performance, as reported in current financial statements, are also uncertain. Examples of such uncertainty relate to depreciation and bad debt provisions. It is likely that a different method of auditing will be appropriate for forecasts – for

²²For example, the estimates might indicate the degree of uncertainty attached to particular (major) projects, and the extent to which expectations are likely to be affected by economy-wide or industry-wide factors.

²³See, for example, T. A. Lee, 'A Case for Cash Flow Reporting', *Journal of Business Finance*, Summer 1972, and 'Goodwill: An Example of Will-o'-the-Wisp Accounting', *Accounting and Business Research*, Autumn 1971, pp. 325–328; C. R. Tomkins, 'The Development of Relevant Published Accounting Reports', *Accountancy*, November 1969; H. C. Edey, 'Accounting Principles and Business Reality', *Accountancy*, November/December 1963; and R. J. Briston and R. A. Fawthrop, 'Accounting Principles and Investor Protection', *Journal of Business Finance*, Summer 1971.

example, the auditor might report whether the estimating procedure is reasonable, and consistent from year to year.

3. *The information required is available only at a high cost.* The information required (cash flow estimates and their related uncertainty) should probably be available already for internal decision making. If it is not, the 'ideal' system may force management to improve internal decision making procedures, or at least to give shareholders a more complete picture of the procedures they are using.

4. *The information would be confusing to shareholders.* The information is unlikely to prove more confusing than that provided under the present system, where a multiplicity of profit figures may be calculated by applying a variety of generally accepted accounting conventions to a given set of business transactions.²⁴ As at present, inexpert shareholders are free to take expert advice.

5. *Management may falsify forecasts to improve their apparent performance.* Auditing the estimating procedure should provide a check on falsification. Furthermore, the provision of regular control information will create a 'learning process' whereby investors identify the forecasts of particular managements as good or bad, optimistic or pessimistic, and so on.

6. *The information would be helpful to competitors.* Provided that all organisations provide forecasts, increased information will flow both from and to a company. The additional information should stimulate competition and generate increased economic efficiency. We accept that the system would be less satisfactory if only some companies provided forecasts, for example if the system was voluntary or if certain organisations were not covered by the legislation.²⁵

For the reasons discussed, we find the above objections unconvincing. However, in addition to (or perhaps because of) these criticisms there is a further factor that must be considered – the weight of historical practice. Traditionally, reports to shareholders cover only past performance and the current position of the business. Of itself, this information is of little help to a shareholder wishing to make investment decisions about the future. However, it may be useful as control information, i.e. as information that will enable the shareholder to appraise the

company's past performance and, from that appraisal, to form expectations about its future performance. This point deserves emphasis; information about past performance, including the analysis of differences between expected and actual performance, is useful only in so far as it generates information that is of help in assessing future performance and hence in making decisions. Even in this context, the usefulness of information about past performance depends on the existence of a sound basis for making initial predictions as the first step in developing a good prediction model.

The message seems clear. In so far as accounting reports are regarded as vehicles for communicating information to shareholders to guide their decisions,²⁶ they should include both estimates of future performance, particularly in terms of dividend expectations, and reports of past performance, including an analysis of differences between expected and actual performance and of changes in expectations. This leads us to the important conclusion that accounting theories based on measuring past performance and the current position of a business can satisfy, strictly, only a part of shareholders' information requirements – those concerned with monitoring past performance.

Unfortunately, the present climate of accounting seems not to be conducive to an early departure from the framework within which it has worked for many years – a framework (which we shall call the *traditional framework*) under which only the current position of the business and its performance for the most recent accounting period are reported. Much writing on accounting theory and practice has adhered to this framework.²⁷ Our view is that, in the long term, accounting must break free from the shackles imposed by adherence to the traditional framework. We realise, however, that many will find this view unacceptably radical. In the short term, therefore, we feel that attempts to improve methods of reporting business performance to shareholders have to be made within the traditional framework, and our subsequent analysis is conducted within this constraint. Thus, our search is for the reporting method that does not violate the traditional framework and that provides the best surrogate for the 'ideal' method.

²⁴See, for example, John Arnold and Mohamed El-Azma, 'Economic and Accounting Measures of Income and Value', forthcoming.

²⁵This latter situation would arise, in respect of UK companies with foreign competitors, if legislation was introduced in the UK, covering only companies registered in the UK.

²⁶The role of Accounting, implied by this statement, is supported by the American Accounting Association. 'The committee defines accounting as the process of identifying, measuring and communicating economic information to permit informed judgments and decisions by users of the information.' American Accounting Association, *A Statement of Basic Accounting Theory* (1966), p. 1.

²⁷For some exceptions in the UK, see footnote 23.

Criteria for Choosing between Reporting Methods

We have argued that shareholders require information to assist them in making predictions about a company's future performance, and in monitoring its performance through time. We have also accepted that the information will be in the form of a report of profit or income for some past period and value at the end of that period. Thus competing methods of measuring past profit and current value must be assessed against two criteria: their usefulness in enabling shareholders to make estimates of the future (their *predictive ability*) and their usefulness in assisting shareholders to monitor a company's performance through time (their *control properties*).

Use of the predictive ability criterion for choosing amongst competing hypotheses is common in many branches of science. Its application to the evaluation of alternative accounting methods of reporting business performance has been suggested frequently during the past decade.²⁸ Several of the studies published have suffered from the lack of a clear justification of the *objects of prediction*, i.e. the values to be predicted. For example, the studies of Frank, and Simmons and Gray tested the ability of certain income measures to predict their own future values.²⁹ Such an interpretation of the predictive ability criterion exposes it to the criticism that the objects of prediction are likely to lack relevance.³⁰ The predictive ability criterion can be defended only if the objects of prediction are justified in terms of their relevance to the users of financial reports. Our previous discussion of the informational needs of shareholders and the 'ideal' method of reporting derived therefrom, suggests that the objects of prediction should be future cash flows and their relative uncertainty. Thus, for example, the predictive ability of income measure A should mean its ability to predict future cash flows and relative uncertainty and not, as has been suggested, its

²⁸This application is justified and described in: W. H. Beaver, J. W. Kennelly and W. M. Voss, 'Predictive Ability as a Criterion for the Evaluation of Accounting Data', *The Accounting Review*, October 1968; and L. Revsine, 'Predictive Ability, Market Prices, and Operating Flows', *The Accounting Review*, July 1971.

²⁹W. Frank, 'A Study of the Predictive Significance of Two Income Measures', *Journal of Accounting Research*, Spring 1969; J. K. Simmons and J. Gray, 'An Investigation of the Effect of Differing Accounting Frameworks on the Predictions of Net Income', *The Accounting Review*, October 1969.

³⁰For a discussion of the problems raised by empirical studies that test the ability of income measures to predict their own future values, see J. G. Louderback III, 'Projectability as a Criterion for Income Determination Methods', *The Accounting Review*, April 1971.

ACCOUNTING AND BUSINESS RESEARCH

ability to predict future values of income measure A.

The application of the predictive ability criterion is in two stages. For each reporting method there will be a number of predictive models which can be used to make predictions about the future from the data given by the method. Thus, the first stage in assessing the predictive ability of various reporting methods is to find, for each method, the predictive model that enables the most accurate predictions to be made from the data given by the method, i.e. the optimal predictive model for the particular reporting method. The testing of alternative predictive models is an empirical matter, to be undertaken using either a real world or a simulated environment. The models to be tested may be based on: (i) simple extrapolation; (ii) extrapolation adjusted for expected environmental changes;³¹ or (iii) more sophisticated statistical techniques.

In developing a predictive model, various measures, including income, may be drawn from the reporting method under consideration. For example, the best predictions of future cash flows and relative uncertainty may be achieved using a model based on past trends of income and turnover and on the current values of assets (however determined). Consideration of only one measure is unlikely to produce a good predictive model in a complicated business situation. In view of the probable complexities involved in developing a predictive model, it seems likely that a different model will be optimal for each reporting method.

The second stage of the application is to find the reporting method which, when the appropriate optimal predictive model is applied to it, gives the best predictions of future dividends and the relative uncertainty attached to them. This method has the highest predictive ability.

The second criterion for assessing a method of reporting to shareholders is its usefulness as an instrument of control. Control in this sense involves the periodic comparison of expected and actual performance and the analysis of differences to provide information for future planning. In the area of management accounting, planning and control are generally recognised as components of an iterative process, each being dependent on the other. We see every reason to treat the prediction and control elements of external financial reporting in the same way. Concentration on predictive ability, to the exclusion of control is unlikely to prove satisfactory, as it ignores the wealth of information that should be generated by a good control system. A general

³¹For example, as in Revsine's 'lead indicator' method; L. Revsine, *Replacement Cost Accounting*, op. cit., chapter 4.

principle of control, based on the simple notion that like should be compared with like, is that, for comparison, actual results should be expressed in the same form as expected results. Thus, in addition to a reporting method that will predict future cash flows available for dividends, we are seeking a reporting method that will enable shareholders to measure actual cash flows for a past period and cash flow expectations at the end of that period. A single reporting method within the traditional framework may not be best for both purposes, and empirical testing should not be restricted to one criterion to the exclusion of the other.

Specification of Reporting Methods

As we noted in our earlier discussion of the research framework to be applied, the reporting methods to be tested may be chosen because of their wide use in practice or as a result of *a priori* analysis. Even in a long term research project, where extensive use is made of computer facilities, we could not reasonably expect to test thoroughly every reporting method that has been advocated in the literature. Consequently, our provisional selection of methods is somewhat arbitrary, although we hope that it provides a reasonable coverage of current thought in accounting theory.

It is convenient to classify alternative reporting methods initially according to the basis used for asset valuation. In the nature of the traditional framework, such a classification also serves as a rough guide to the method of income measurement used.³² As a guide to the income measurement method, however, classification according to the basis of asset valuation does not take account of items such as the method of capital maintenance, the treatment of holding gains on non-monetary assets and the treatment of gains or losses on holding net monetary assets. Differences such as these require careful specification before the reporting methods are finally tested.

The methods selected provisionally, identified by reference to writers who have recommended their use, are as follows:

Basis of asset valuation	Method recommended by
Historical cost	Y. Ijiri ³³

³²Under the traditional framework the income of a firm for a period is generally defined as the change in the value of the firm during the period, subject to adjustments for dividends and new capital. Thus, the income measurement method used is largely determined by the chosen valuation method.

³³Y. Ijiri, *The Foundations of Accounting Measurement* (Prentice-Hall, 1967).

Historical cost adjusted by the Retail Price Index	I.C.A.E.W. ³⁴
Replacement cost	E. O. Edwards and P. W. Bell ³⁵
	R. S. Gynther ³⁶
	R. L. Mathews ³⁷
	L. Revsine ³⁸
Realisable value	R. J. Chambers ³⁹
	R. R. Sterling ⁴⁰

Economic value (net present value) ⁴¹

Most of the methods are supported in the literature by *a priori* analysis, although this analysis is rarely based on our assumed criteria for usefulness of predictive ability and control.

Strictly, the methods described under the first two bases of asset valuation (historical cost and historical cost adjusted by the R.P.I.) cover a very wide range of income and value measurements, depending on which combination of accounting conventions is chosen. Given the substantial choice of conventions that may be applied to each of a number of categories of assets, liabilities, costs and revenues, the number of combinations that could be applied to a set of business transactions is almost infinite. Empirical research is currently being undertaken at the University of Manchester to determine which accounting conventions are most widely used in practice, and thus appear to warrant the earliest examination. However, we note the possibility that, within the historical cost framework, the best methods (i.e. having the highest predictive and control value) of measuring and reporting certain items, for example depreciation, may not be widely used in practice.

³⁴The Institute of Chartered Accountants in England and Wales, *Accounting for Changes in the Purchasing Power of Money* (Provisional Statement of Standard Accounting Practice No. 7, 1974).

³⁵E. O. Edwards and P. W. Bell, *The Theory and Measurement of Business Income* (The University of California Press).

³⁶R. S. Gynther, *Accounting for Price-Level Changes: Theory and Procedures* (Pergamon Press, 1966).

³⁷R. L. Mathews, 'Income, Price Changes and the Valuation Controversy in Accounting', *The Accounting Review*, July 1968.

³⁸L. Revsine, *Replacement Cost Accounting*, op. cit.

³⁹R. J. Chambers, *Accounting Evaluation and Economic Behavior* (Prentice-Hall, 1966).

⁴⁰R. R. Sterling, *Theory of the Measurement of Enterprise Income* (The University of Kansas Press, 1970).

⁴¹Net present value has been suggested as an 'ideal' (but impracticable) basis of asset valuation by numerous writers. As part of the research project, we intend to test both its suitability as an ideal measure and its practicability.

Method of Testing

We noted earlier that one of two alternative methods may be used to test the potential of the reporting methods selected to satisfy the predictive ability and control criteria. The various reporting methods may either be applied to real world data, or may be tested by simulation experiments. Both methods of testing have been used in empirical studies of predictive ability.⁴²

The major advantage of using real world data is that they reflect a set of environmental circumstances that have actually occurred. Provided that the data selected cover a reasonably long period of time, alternative reporting methods may normally be tested under a wide range of observed environmental conditions. Simulation models, like other models, are simplifications of the real world and, as such, are not intended to be completely realistic. (If they were, they would no longer be models!) However, because of their relative simplicity, simulation models may normally be manipulated more rapidly, and more closely in accordance with the hypotheses to be tested, than may real world data.

For the purpose of testing alternative reporting methods, simulation has three particular advantages. The first is that it allows examination of a wide range of environmental circumstances that may not have actually existed in the recent past, although they may be expected to occur in the future. Thus, for example, simulation allows the analysis of both rising and falling price levels over as wide a range as is desired (subject to limits imposed by available computational facilities). The second advantage is that once the simulation model is constructed and computerised, the values of particular parameters may be varied, and revised results calculated very much more quickly than if the same adjustments were attempted to real world data. The third advantage is that data may be assumed that could be obtained by a researcher only with great difficulty, if at all, from real world sources. For example, to calculate the economic value (net present value) of an asset, estimates of future cash flows are needed. Such estimates are normally not available in current accounting statements, nor can the researcher obtain them easily from any other sources at present.

On balance, we feel that the advantages of simulation suggest that it should be used, at least initially. When the relative merits of the alternative reporting

⁴²For an example of the use of real world data, see W. Frank, *op. cit.* For an illustration of the application of simulation, see J. K. Simmons and J. Gray, *op. cit.* As we have noted previously, the usefulness of both studies is somewhat limited by a failure to justify the choice of variables that are to be predicted (the objects of prediction).

ACCOUNTING AND BUSINESS RESEARCH

methods have been clarified by simulation, the conclusions should also be tested using real world data.

Using simulation, alternative reporting methods are applied to hypothetical firms, and their predictive ability and control properties are tested under a range of assumed internal and environmental conditions.⁴³ For example, the performance of the methods might be tested under various assumptions about rates of real growth, rates of price changes (general and specific), discount rates, cash flow configurations, average lengths of project lives, and so on. They may also be tested using different assumptions about the degree of market competitiveness for the firm's inputs and outputs. Both deterministic and probabilistic simulation models may be used.

The assumptions used in constructing the simulation models should be as realistic as possible. However, we note that the trade-off between reality and simplicity (which allows greater flexibility and a wider testing of internal and environmental conditions) is a matter for fine judgment by the researcher.

Although we have argued in favour of simulation experiments rather than the use of real world data as a first means of testing alternative reporting methods, we believe that a reporting method must eventually be judged according to its observed usefulness. Such a test is a particularly important part of the research project we have proposed in this paper in view of the assumptions we have made about an appropriate share valuation model (using the portfolio approach) and the simulated nature of the data we shall use in testing alternative reporting methods. Unfortunately, a good empirical test of the usefulness of a reporting method depends on that method being implemented. Consequently a thorough empirical testing of alternative methods is unlikely to be feasible in the near future.

Test of Practicability

Simulation testing, as described in the previous section, will provide a provisional ranking of alternative reporting methods. The methods that appear to perform best against the chosen criteria should be tested for practicability (i.e. feasibility and cost) prior to a final recommendation. The final choice of method depends on an assessment of both the benefits and costs of alternative methods.

A number of empirical studies have tested the practicability of income measurement and asset

⁴³For a further illustration of the use of simulation see John Arnold and Mohamed El-Azma, *op. cit.*

valuation based on replacement costs and on historical costs adjusted by a general price level index.⁴⁴ There seems to be consensus amongst the authors of these studies that both sorts of adjustments are feasible. Once the required conventional data are collected, annual adjustments for general price level changes are relatively easy and inexpensive. Replacement cost information is generally more difficult, and more expensive, to obtain, but the cost is apparently not so great as to discourage further research into the usefulness of reporting methods based on replacement cost asset valuations.

Strictly, the feasibility and cost of particular reporting methods are likely to be peculiar to individual companies. In practice, more extensive empirical tests along the lines of those already undertaken should provide an indication of the practicability of alternative methods and may clarify the characteristics of firms in which adjustments are most practicable. For example, replacement cost information may be more readily available in some industries than in others.

Summary and Conclusions

In this paper we have outlined a research framework that might be used in assessing the relative merits of alternative methods of reporting business performance. We suggested that the first stage in such a framework is a statement of objectives, empirically based or, in the lack of adequate empirical evidence, assumed. On the basis of an assumed objective of providing shareholders with information to guide their decisions, and assuming certain personal objectives for shareholders, we outlined an 'ideal' method of reporting that should substantially satisfy shareholders' informational needs. The 'ideal' method involves the regular provision by companies of estimates of future cash flows and relative uncertainty, and of statements of actual performance, with explanations of differences between expected and actual cash flows. We outlined the criticisms of this sort of system of reporting and gave our reasons for

rejecting them. However, we conceded that the substantial change implied in reporting methods is unlikely to be accepted in the near future, and, in view of the urgent need to review current reporting practices,⁴⁵ we suggested that only methods that fit the 'traditional framework' should be considered at this point in time.⁴⁶

Bearing in mind the assumed informational requirements of shareholders, and recognising the need to adhere to the traditional framework, we suggested two criteria for usefulness to be applied to the assessment of alternative reporting methods: predictive ability and control. We discussed the application of these criteria, and emphasised, in particular, the importance of specifying the objects of prediction, i.e. future cash flows and their relative uncertainty. We outlined a number of reporting methods, advocated in the literature, whose usefulness might be tested, and suggested simulation as the most suitable means of testing initially, although we noted the need for eventual tests based on observed usefulness. We also discussed the need to test the practicability of alternative methods before a recommendation is made.

The approach that we have suggested is scientific; hypotheses are tested that have been the subject of *a priori* analysis. In general we have favoured deductive reasoning and simulation experiments as appropriate tools of scientific analysis. We recognise the persuasive arguments in favour of using real world data in setting up and testing hypotheses in accounting theory but, in view of the severe difficulties involved in collecting such data in a reliable form, we have rejected their use in the early stages of the project in a number of cases (a major exception being in testing practicability).

We believe that the areas of accounting research concerned with the reporting of business performance should now proceed along the lines that we have suggested, alternative reporting methods being tested scientifically for their ability to satisfy certain criteria for usefulness, these criteria being based on a careful specification of the objectives assumed for accounting reports.

Acknowledgement

We are grateful to our colleague, Professor Bryan Carsberg, for his perceptive comments on an earlier draft of this paper.

⁴⁴See, for example, Anthony Hope, *Accounting for Price-level changes - A Practical Survey of Six Methods* (Institute of Chartered Accountants in England and Wales Research Committee Occasional Paper No. 4, 1974); R. C. Dockweiler, 'The Practicability of Developing Multiple Financial Statements: A Case Study', *The Accounting Review*, October 1969; R. C. Jones, 'Price-Level Changes and Financial Statements', *Case Studies of Four Companies* (American Accounting Association, 1955); D. A. Corbin, 'The Impact of Changing Prices on a Department Store', *The Journal of Accountancy*, April 1954; E. S. Hendriksen, *Price-Level Adjustments of Financial Statements - An Evaluation and Cost Study of Two Public Utility Firms* (Washington State University Press, 1961); and P. J. Dickerson, *Business Income - A Critical Analysis* (University of California Press, 1965).

⁴⁵As evidenced by the establishment of the Accounting Standards Steering Committee in the UK and of similar bodies in the USA and elsewhere.

⁴⁶Under the 'traditional framework' a company reports only on its profit or loss for some past period and its value at the end of that period.

What Price Shares?

Brian Pizzala

To the author's knowledge no work has been done which attempts to provide an estimate of the intrinsic worth of shares in general. This is both surprising and worrying given the obvious importance of investment in shares by many of the major financial institutions. For example, if over the years hundreds of millions of pounds had been invested in a group of assets whose values were in a fundamental sense too high then at some indeterminate time in the future this would be finally reflected in the market value of shares with disastrous consequences.

The exploratory work described in this paper only enables a range to be put on the likely real worth of shares in the first quarter of 1974, and not surprisingly it is a fairly wide range. Nevertheless it does provide some order of magnitude of the underlying worth of shares. First the theoretical background to the approach used is considered.

The Theoretical Background

This section of the paper sets out the theoretical background upon which the paper's conclusions are based by considering the relationship between share prices, the yield on shares, retained earnings and the return earned by companies on their assets. These relationships are illustrated in Table 1. It assumes a simplified model of company and share earnings to demonstrate that in conditions of perfectly competitive equilibrium the price of shares will equal the value of the company's capital employed which they represent. This is equivalent to the yield on shares equalling the return obtained by companies on their assets. For simplicity of exposition it is assumed that companies do not pay tax. Thus, for example, if a company has no gearing and it initially has £100.00 worth of capital employed represented by £100.00 worth of shares, and if the capital employed achieves a return of 10% then this will equal the yield on the market value of the company's shares, as long as they remain valued at £100.00.

Assuming that 50% of the company's earnings are retained the dividend yield will be 5% and the value of its capital employed will increase by 5%. If the market value of its shares also increases by 5% the market value of the company's shares will still equal the value of the company's capital employed. If the company carries on earning 10% on its assets and retaining 50% then the value of its assets will continue to equal the value of its shares as long as the latter increase in value at 5% p.a. If the rate of return (i.e., share yield) required by shareholders is 10% then the process that has been described will reflect the market valuation of the company's shares. A share value higher than the company's assets shown in column 1 will mean that shareholders are obtaining an inadequate return relative to their 10% requirement and market forces will bring the share price shown to give the required return and conversely if the shares are valued for less than is shown in column 1. Therefore provided investors carry on requiring a 10% return the value of the company's shares must equal the values shown in column 1 in conditions of perfectly competitive equilibrium.

For a time, however, it is possible that the market value of shares may not reflect the underlying value of the assets they represent. For example, if the return investors require falls for any reason from the previous 10% then they will initially bid up the price of shares until the yield in relation to the new level of share prices is satisfactory. This is illustrated in columns 1a to 4a of Table 1. The absolute level of earnings and dividends initially remains unchanged, but from year 3, say, the market value of the shares increases, in this example by 100%, so that the yield becomes 5% and the dividend 2½% on the shares' market value. However, although the yield is 5% shareholders are in fact obtaining a 7½% return since the dividend yield of 2½% is increasing at 5% a year.¹

¹A proof of this is given in the appendix.

TABLE 1
The Relationship between Share Prices, Retained Earnings and the Expected Rate of Return*

1	2	3	4	4a
<i>Investment plus Retained earnings = capital employed</i>	<i>Earnings</i>	<i>Retained Earnings</i>	<i>Dividend</i>	<i>Share Value</i>
100.000	10.000	6.000	5.000	100.000
105.000	10.500	5.250	5.250	105.000
110.250	11.025	5.513	5.512	110.250
115.763	11.576	6.788	6.788	115.763
121.551	12.155	6.078	6.077	121.551
127.629	12.763	6.382	6.381	127.629

*Note all figures are absolute - not percentages.

While a lower return is permanently acceptable to investors the situation illustrated is nevertheless in disequilibrium and is therefore unsustainable in the long run. Although share prices have doubled, the return to shareholders is $7\frac{1}{4}\%$ rather than the 5% yield on shares but only because the original £100 investment plus retained earnings of the company are still assumed to be earning 10%. This situation cannot last indefinitely. If the return required by shareholders is now permanently at $7\frac{1}{4}\%$ this will be gradually reflected in the returns obtained by companies on all their assets. This is because new businesses and new investments by firms will be expected to earn a return of $7\frac{1}{4}\%$ instead of the previous 10%. Because of the effect of this on lowering the prices of goods and services sold the return on older assets will decline as competition eventually forces the prices obtained for their output down, so that it will be impossible for the company depicted in Table 1 to carry on earning the 10% on its assets as assumed in columns 1a to 4a. Eventually therefore the return on all assets - old and new - will be brought down to the $7\frac{1}{4}\%$ now required by investors. This being so the level of share prices shown in column 1a will be too high some time from year three onwards once the earnings generated by the initial investment in column 1 fall below 10%. Once equilibrium is achieved the value of shares, at the new level of returns, will be the original value of the company's assets plus retained earnings. Confirmation of this can be obtained by assuming an instantaneous movement to equilibrium in year three. In this case the initial assets are still £110.25 but instead of generating a 10% return of £11.025 they now generate a 7.5% return of £8.269. Given this new earning capacity the only consistent value of shares for year three in column 1a is £110.250; any value greater than this will give an initial dividend yield less than 3.75%, but growing at 3.75% a year, which will give a return of less than $7\frac{1}{4}\%$, while if the share price is less than £110.25 the converse will apply.

A more complicated situation occurs when a discrepancy between what return investors require and what companies earn occurs because companies are no longer capable of meeting shareholders' expectations. Such a situation could occur if labour succeeded in permanently increasing its share of the national income. In this situation there are only two long term possibilities. In one case investors would become reconciled to the lower rate of return, in which case an equilibrium situation will be able to occur in which share prices and companies' assets are equivalent in value although prior to this share values will be depressed.

The other alternative is that investors fail to accept the lower rate of return. This situation is one of total and disruptive disequilibrium. Firms are unable to achieve an acceptable rate of return on their assets so they will be unable to obtain new funds from the market. Consequently even if the managements of firms are willing to invest their capital stock will eventually start to run down since across the economy as a whole firms will not be able to sustain the real level of their capital stock from retained earnings as dividends will still have to be paid. Moreover, even if firms did manage to maintain their real capital stock the consequences would still be adverse, because as long as there is technical progress in the economy the capital stock has to be continually increased if full employment is to be maintained.

It is at least arguable on the basis of the real before tax returns estimated in Table 3 that the economy is near this situation. However, as far as this paper is concerned this possibility is deliberately excluded from the analysis, and it is specifically assumed that if shareholders obtain a smaller real return than in the past it will nevertheless be acceptable to them.²

Thus in equilibrium conditions the market value of shares will equal injections of capital plus retained earnings, while the earnings yield on shares will equal the earnings capacity of the company's assets. Thus the return obtained by shareholders will be equivalent to the earning capacity of assets. In non-equilibrium situations the return shareholders obtain may bear little relationship to the underlying return on company assets, though such a situation cannot be expected to last indefinitely because of the inherent inconsistency between the return shareholders will accept and the earnings companies are actually achieving on their shareholders' funds. No claim is made that non-equilibrium conditions are short-lived, many years could pass during which the market value of shares could fail to move around the equilibrium level. The processes described which would tend to bring about equilibrium are clearly long-drawn out ones.

Company Earnings

Table 2 sets out the basic information on company earnings and balance sheets from which the initial valuation of shares is made on the basis of

ACCOUNTING AND BUSINESS RESEARCH

historical asset costs. The information is taken from the *Annual Abstract of Statistics*,³ and its figures are taken from the accounts of quoted companies mainly engaged in manufacturing, distribution, construction and some miscellaneous services. Thus companies mainly operating overseas, and those whose main interests are in agriculture, shipping, insurance, banking, finance and property are excluded. In absolute terms the figures are not comparable through time because of changes in the companies covered and the changing importance of those covered. However, for ratios such as the return on capital employed or the importance of gearing in companies' funds, the figures should be comparable over time.

Figures shown in the Annual Abstract do not refer to calendar years. The data for 1955, say, is taken from companies whose accounting year ended between the 6th April 1955 and 5th April 1956. Thus the mid point of the period reported in the companies' accounts will be April 1955; so on an annual basis the figures approximately reflect the actual position of companies for the period October 1954 to September 1955.

Before coming on to the main theme of the paper it is worthwhile briefly considering the changed financial position of companies over the last fifteen years or so. Net trading profit as a percentage of capital employed is shown in Table 3. This shows a downward trend until the mid 1960s, with a very slight improvement thereafter. On converting these money rates of return into a real rate of return by using the inflation rate for 'All Goods and Services Sold on the Home Market' the decline in the rate of return carries on throughout the period. The real rate of return is calculated by noting that the rate of return on the historic value of a company's assets is meant to give an estimate of the money return on its assets, in other words a return gross of inflation. Theoretically at least therefore an estimate of the real return on the company's assets can be very simply made without any reference to 'Accounting for Inflation' adjustments to net assets or depreciation. Assume in the absence of inflation an 8% return is being obtained on assets; a return which is both 8% in real and money terms because of inflation's absence. If subsequently there is inflation of 10% p.a. then the 8% must increase to 18.8% to retain the same real return; in other words after a year the amount paid back to the investor if his loan is to be cleared must be $1.08 \times 1.1 = 1.188$. Thus the real return is estimated from the money return by the

²Merrett and Sykes estimated that between 1946 and 1966 the return to shareholders was about 7 per cent p.a. in real terms, net of tax (see their article in 'Studies In Optimal Financing' edited by R. J. Lister). Clearly this is a very high return so that there should be very considerable scope for its reduction.

³Apart from 1972 when the data was taken from 'Financial Statistics', March 1974.

relationship:

$$r^* = (1+r) \div (1+i) - 1$$

where r^* is the real rate of return, r is the money rate of return, and i is the general rate of inflation.

As a matter of interest the above implied real returns are compared with an 'Accounting for Inflation' estimate of the real returns of the companies' sector of the economy. The 'National Income and Expenditure' publications have most of the information required. Estimates are given of net capital stock at replacement cost, depreciation at current costs, book value of stocks and work in progress, and an estimate of stock appreciation. On assuming the same ratio of working capital to stocks and work in progress as in Table 2 an estimate of working capital is obtained. Hence all the information required to estimate the real return to the companies' sector by conventional methods is available. These estimates are shown in column 1 of Table 3.

Both sets of estimates show a similar trend and level, but with the implied real return generally being a little lower, even when allowance of about half a percentage point is made for the implied return being on the closing capital stock, rather than an average of the opening and closing figures as are the company sector estimates.

Although there has been a decline in the money returns on capital employed this has not been fully matched by a decline in disposable income as a return on shareholders' interest (i.e., that part of the capital stock owned by the companies' shareholders). There are a number of reasons for this. Gearing increased very significantly over the period; bank loans and overdrafts plus long term loans increased from around 19% to well over 40% of shareholders' interest. Although interest rates more than doubled because they are allowable against tax, the higher rates of interest towards the end of the period would still have effectively been less than companies were earning on their capital employed so that the increased gearing would have helped maintain the shareholders' return. The increased gearing and increasing interest rates would also have contributed to the fall in the incidence of taxation from around 50% of net trading profits in the mid 1950s to around 40% and less by the late 1960s and early 1970s. It is also likely that investment grants became more generous over the period and reduced the effective rate of tax, even if they had not the rate of tax would still have declined since profits before depreciation were falling relative to capital employed while allowances would have remained proportionately the same. Also included in distributable profits are various capital receipts.

From 1967 these jumped from around the £50 million they had been to several hundred million as a result of investment grants.

The Comparison of Company Earnings with Share Yields

Distributable profits have already been shown as a return on shareholders' interest, however, the definition of earnings yield on shares is such that a number of adjustments have to be made to the figures. Prior to August 1965 earnings for yield purposes were taken as net trading profits⁴ less income tax, profits tax, other charges and net preference dividends (define this as net profits). Net profits were then 'grossed up' for income tax. This grossing up was done, in effect, by multiplying net profits by $1 \div (1 - \text{standard rate of income tax})$. From August 1965 earnings for yield purposes were taken as net trading profits less corporation tax, other charges and gross preference dividends. Capital items are normally excluded from the calculation of earnings, unless they are spread over an asset's life.

Earnings are taken from the latest report and accounts of the companies. This means that even if there were a zero lag between the end of the financial year and the publication of accounts published earnings yields would refer to earnings on average a year ago.⁵ On allowing a lag of three months between publication and the end of the financial year a lag of a year-and-a-quarter is obtained. Thus the mid point of the year for the presentation of earnings yield is end June 1955 say, but this figure refers to an actual company's earning period centred on end-March 1954.

The items that have to be deducted from distributable earnings in Table 2 to obtain an earnings figure consistent with that in calculating yields on share values are also shown in the Table. With these adjustments and with grossing up for income tax, companies' earnings are shown as a return on shareholders' interest less goodwill and the proportion represented by preference shares. These returns on company funds are then compared with the earnings yield on the *Financial Times* Index of Industrial Ordinary Shares in Table 4.

The yield on shareholders' interest has been consistently higher than the yield on shares taken at market value. On referring back to the arguments of the first section of the paper this means that in

⁴As defined in Table 2.

⁵Bearing in mind that the beginning of the yield calculation year the first company's accounts would apply to a period six months ago on average, and by the end of the yield calculation year this would become eighteen months.

TABLE 2
Income and Finance of Quoted Companies, £m

	1954	1955	1956	1957	1958	1959	1960	1961
Net Tangible Fixed Assets	3,912	4,391	5,008	5,649	6,196	6,713	7,136	7,965
Stocks and Work in Progress	3,287	3,663	4,010	4,226	4,155	4,266	4,758	5,060
Trade and other Debtors	2,200	2,517	2,679	2,854	2,874	3,261	3,515	3,744
Cash	859	736	661	660	705	765	675	631
Trade and other Creditors	(1,868)	(2,108)	(2,278)	(2,436)	(2,449)	(2,693)	(2,842)	(3,035)
Capital Employed	8,390	9,199	10,080	10,953	11,481	12,312	13,242	14,365
Trading Profit	1,667	1,809	1,869	1,952	1,983	2,258	2,415	2,344
Depreciation	(268)	(305)	(347)	(393)	(443)	(486)	(516)	(572)
Net Trading Profit	1,399	1,504	1,522	1,559	1,540	1,772	1,899	1,972
Shareholders' Interest	6,701	7,368	7,993	8,633	9,226	10,009	10,727	11,627
Goodwill	(269)	(280)	(286)	(273)	(265)	(293)	(377)	(467)
Preference Shares	(918)	(945)	(951)	(957)	(953)	(958)	(974)	(980)
Ordinary Shareholders' Int.	5,514	6,143	6,756	7,403	8,018	8,758	9,376	10,180
Disposable Income	692	780	759	771	817	1,018	1,051	970
Preference Dividends	(29)	(30)	(31)	(31)	(31)	(34)	(36)	(36)
Minority Interest	(16)	(19)	(20)	(21)	(22)	(25)	(28)	(26)
Capital Receipts	(51)	(41)	(28)	(24)	(36)	(69)	(71)	(63)
'Earnings'	596	690	680	695	728	890	916	845
Bank Loans and Overdrafts	335	393	463	510	489	561	709	880
Long Term Loans	842	931	1,048	1,212	1,294	1,372	1,391	1,562
Gearing	1,177	1,324	1,611	1,722	1,783	1,933	2,100	2,432
Interest on Long Term Loans	32	37	44	53	61	67	69	76
Taxation	722	737	775	795	734	761	877	838

Source: 1954 to 1971 various Annual Abstracts of Statistics; 1972 Financial Statistics March 1974.

relation to the historic value of net assets the market has been valuing shares in excess of the actual value of the aggregate of shareholders' interest. Because of the time lag between the time when earnings yields are published and the company results to which they in fact refer the share yields should be compared with the company yields of the previous 'year' in Table 4. Thus in 1972 the share yield of 4·98% should be compared with the companies' yields of 10·8%. According to this paper's interpretation of the figures this means that the market was overvaluing shares by over 100%, again remembering that company balance sheets are based on the historic costs of assets.

Information is not available after 1972 on companies' earnings relative to shareholders' interest. Enough information is available, however, to make a rough estimate of the improvement in companies' earnings. For the year beginning 4th quarter 1972 the gross trading profits of the companies' sector of the economy increased 28% on the previous year according to provisional figures issued by the CSO. On assuming a 10% increase in capital employed and all the sources of finance for it, allowing for 20% higher interest rates, and 10% higher tax allowances other than interest charges, an estimated return of 16·4 on shareholders' interest is obtained. This compares with current (i.e., February) share

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
8,660	9,291	10,083	11,185	11,759	11,642	12,389	13,120	13,707	14,949	13,081	
5,119	5,340	6,008	6,568	6,868	6,966	7,467	8,208	8,743	9,053	7,561	
3,902	4,346	5,147	5,695	6,167	6,622	7,500	8,362	8,948	8,759	7,459	
656	789	950	911	980	1,115	1,206	1,238	1,210	1,554	1,859	
(3,173)	(3,561)	(4,078)	(4,563)	(4,852)	(5,152)	(6,839)	(7,000)	(8,132)	(8,439)	(7,228)	
15,164	18,205	18,110	19,774	20,902	21,193	22,723	23,928	24,478	25,876	22,732	
2,347	2,654	3,116	3,227	3,161	3,208	3,711	3,788	3,739	4,306	4,120	
(628)	(690)	(770)	(861)	(927)	(942)	(1,050)	(1,112)	(1,171)	(1,294)	(1,090)	
1,719	1,964	2,346	2,366	2,234	2,266	2,661	2,656	2,568	3,012	3,030	
12,263	12,986	13,949	15,078	15,389	15,223	16,057	16,456	16,771	18,085	15,836	
(503)	(562)	(668)	(710)	(814)	(829)	(1,118)	(1,290)	(1,405)	(1,572)	(1,592)	
(1,000)	(1,008)	(1,042)	(1,028)	(924)	(837)	(734)	(606)	(533)	(514)	(386)	
10,760	11,416	12,239	13,340	13,651	13,557	14,205	14,580	14,833	15,999	13,858	
960	1,096	1,288	1,541	1,035	1,592	1,743	1,680	1,768	2,007	2,081	
(36)	(37)	(40)	(39)	(35)	(53)	(49)	(40)	(34)	(36)	(26)	
(29)	(33)										
(69)	(67)	(48)	(51)	(39)	(317)	(292)	(276)	(307)	(241)	(179)	
874	1,010	1,200	1,451	961	1,222	1,402	1,364	1,427	1,730	1,876	
950	1,062	1,302	1,645	1,876	1,871	2,114	2,601	3,001	2,887	2,395	
1,852	1,993	2,278	2,622	3,158	3,635	4,150	4,355	4,787	5,250	4,915	
2,802	3,055	3,578	4,267	5,034	5,506	6,264	6,956	7,768	8,137	7,310	
90	106	122	142	176	207	249	282	306	354	323	
812	910	1,114	890	1,118	923	1,139	1,180	1,042	1,149	1,056	

yields of 13.8. With the imputation system earnings yields are calculated on the full distribution basis. Assuming corporation tax of 40% under the corporation tax regime and 50% under the imputation system the new method of calculating yields implies, other things equal, at least a 16.3% increase in share yields. Thus company earnings under corporation tax of 16.4% would be 19.1% with the imputation system.

Purely on the basis of company balance sheet valuations it appears that shares were overvalued by 28% at a time when they were unprecedently depressed because of the combined pressures of economic and political crises. Fortunately, however,

the next section shows that this comparison gives too depressing a picture.

Accounting for Inflation Adjustments

The analysis so far has been based on company accounts which have net assets written down on the basis of historic costs. According to the conventional accounting for inflation theory this will result in the value of fixed assets being underestimated, since the historic cost will not have been adjusted to take account of their increasing money value. The Central Statistical Office produces estimates of the net fixed assets of the companies sector of the economy at replacement cost, these are calculated from actual

TABLE 3
Rates of Return

<i>Year</i>	<i>Directly Estimated Real Return of Companies</i>	<i>Money Return of Quoted Companies</i>	<i>Implied Real Return of Quoted Companies</i>	<i>Money-Return on Shareholders' Interest, Quoted Companies</i>
1954		16.7	14.5	10.3
55		16.3	12.2	10.6
56	10.9	15.1	10.6	9.5
57	10.6	14.2	9.7	8.9
58	9.9	13.4	9.8	8.9
59	10.5	14.4	12.4	10.2
1960	11.4	14.3	12.6	9.8
61	10.0	12.3	9.5	8.3
62	9.1	11.3	7.5	7.8
63	9.9	12.1	9.2	8.4
64	10.2	13.0	9.7	9.2
65	9.7	12.0	7.3	10.2
66	7.7	10.7	6.1	6.7
67	8.2	10.7	7.4	10.5
68	8.0	11.7	7.1	10.9
69	6.8	11.1	5.8	10.2
1970	5.0	10.4	3.8	10.5
71	5.1	11.6	3.4	11.1
72	5.0	13.3	5.2	13.1

investments by this sector. Thus the CSO has estimates of net fixed assets both at historic cost and at replacement cost; these are compared in Table 5 for a number of years.

On the basis of the latest estimates the value of written down fixed assets is 51% higher on a replacement basis. On applying this increase to the 1972 net tangible fixed assets of companies shown in Table 2 their value is increased by £6,671 million, so increasing the value of the ordinary shareholders' interest by the same amount. With this addition the value of shareholders' interest is increased 48%. On the basis of the analysis in the previous section it appeared that shares were overvalued by 28% during February. Now with the accounting for inflation adjustments based on the CSO estimates

it appears that shares were undervalued by 7%, i.e. $(1 - 0.28) \times 1.48 = 1$.

With this adjustment the underlying value of the *Financial Times* Index of Industrial Ordinary Shares would be an index number of 339, since its February value was 316.5. This compares with the highest annual value of the index of 503.8 in 1972.

Theoretical Criticisms of Accounting for Inflation

As stated in the previous section, the valuation of net fixed assets with depreciation based on a 100% write down of historic costs is supposed, on the basis of accounting for inflation theory, to result in an undervaluation of assets in inflationary conditions.

TABLE 4
Comparison of Share Yields and
'Company Yields'

Year	Earnings Yield FT Index of Industrial Ordinary Shares	'Company Yields'
1954		19.6
1955	12.85	20.4
1956	15.92	17.5
1957	15.04	16.3
1958	14.96	16.8
1959	10.82	17.7
1960	9.02	15.9
1961	9.62	13.6
1962	8.88	13.3
1963	6.73	14.5
1964	7.36	16.0
1965	9.12	10.8 – 17.8 *
1966	8.52	7.0 – 12.0 *
1967	6.69	9.0
1968	4.89	9.8
1969	5.82	9.4
1970	6.54	9.6
1971	6.21	10.8
1972	4.98	13.5

*There is some ambiguity in the figures for these years because of a change in the method of calculating earnings due to the introduction of Corporation Tax. The yield is shown both unadjusted and grossed up, the latter being the higher figure. The difficulty in obtaining the correct yields for these years clearly does not affect the overall comparisons.

However, it can be simply shown that even with inflationary conditions the correct or economic method of depreciation still involves a 100% write off of assets' historic values over their economic life. All that inflation does is to change the time profile of the annual depreciation charges.⁶

A priori, therefore, it cannot be concluded that

⁶See F. B. Pizzala 'Pricing and Distribution in an Inflationary World' in *Accounting and Business Research*, Autumn 1973.

any of the conventional methods of depreciation applied to the historic cost of assets result in an undervaluation of assets in an inflationary world. It is hopefully, a question for investigation what impact conventional methods of depreciation have on the valuation of assets under the actual conditions of inflation relevant to a particular problem. The next section of the paper explores this question further.

Economic Depreciation and Accounting for Inflation

This section compares the written down value of assets using straight line depreciation against the value of assets in real terms (i.e., assuming no inflation) obtained by using economic depreciation, and then revaluing these values by the standard accounting for inflation adjustments. In making these adjustments the economy's rates of inflation were used combined with the pattern of gross investment undertaken by the companies sector of the economy. Two basic real cash flows were studied, one in which the cash generated declined linearly over 20 years, except that only 50% of profits are assumed in the first year of commissioning. The other profile assumes increasing then decreasing profits. These two profiles reflect the likely range of cash flow profiles.⁷ Additionally, it was assumed that with each project investment was spread over two years, and that working capital was 20% of capital expenditure lagged a year. The cash profiles for the two projects are shown in Table 6. These real cash flows were assumed to give a real return of 8% and on this basis the net value of each investment was calculated for each year of its life using economic depreciation; these values are also shown in Table 6. Thus for example if the profits in year 9 of project 1 are considered and from these are deducted the project's economic depreciation (i.e., 70.44 less $63.07 = 7.37$) and this net profit is then divided by the project's net worth at the beginning of the year (i.e., 70.44) then the resulting return equals the project's DCF return of 8%; i.e. $(13.00 - 7.37) \div 70.44 = 0.08$.

Since the calculations of net worth shown in Table 6 were specifically done in real terms they would have to be adjusted upwards in inflationary conditions. Thus for example if from the start of project 1's life inflation had run at a constant 10% a year then the project's economic net worth in year 17 would be $22.06 \times (1.1)^{17} = 111.5$. This does not contradict the statements made in the previous

⁷For a more detailed discussion see F. B. Pizzala 'Depreciation and Rates of Return' in *Accounting and Business Research*, Spring 1973.

TABLE 5*
Comparison of Net Fixed Assets for the Companies Sector at Historic and at Replacement Cost
(£ thousand million)

Year	Historic Value	Replacement Cost Value	Ratio of Replacement Cost to Historic Cost
1961	14.3	19.2	1.34
62	15.5	20.7	1.34
63	16.7	22.0	1.32
64	18.1	23.9	1.32
65	19.7	26.1	1.32
66	21.2	27.9	1.32
67	21.9	28.7	1.31
68	23.7	31.3	1.32
69	25.8	34.8	1.35
1970	28.2	39.6	1.40
71	30.6	44.6	1.46
72	33.1	50.1	1.51

*The figures in this table were kindly supplied by Mr. T. J. Griffin of the CSO.

section since for projects 1 and 2 the annual depreciation charges were initially calculated on the explicit assumption of no inflation. Thus if we had a stream of projects in the economy over the last 22 years with the same real cash flow profiles as project 1 we could calculate a relative index of their combined net worth given both the actual inflation in the economy and the rate at which investment has grown in monetary terms.

A calculation of this form is illustrated in Table 7 for projects with the same real cash flow profile as project 1. The first column shows the economic net worth of project 1 over its economic life. In the absence of inflation and real growth in the capital stock there would be 22 projects with economic worths ranging from 49.46 for the most recent to 18.31 for the one whose economic life was about to terminate. Thus the economic net worth of all projects would be the summation of the net worths in column 1. With inflation these economic net worths will be incorrect, so that they have to be adjusted by the economy's general rate of inflation; the inflation adjustment factors for the economy are shown in column 2. Thus over the 22 year period cumulative inflation was 139%, so that the first investment of 18.31 has to be increased by a factor of 2.39. But because the

level of investment has been growing in both money and real terms, it is necessary to weight the various investments that have taken place over the 22 year period; so that column 3 shows the monetary adjustment factor for the growth in investment by the companies sector of the economy with base 1953 = 1.00; thus for example in 1956 the companies sector undertook 1.54 times as much investment in money terms as in 1953. Therefore on multiplying out columns 1-3 we get in column 4 the relative weights of the net worths of all 22 investments.

An exactly analogous calculation was done on the assumption that the economy's investments have the same real cash flow profile as project 2.

These two calculations of the current value of all investments were then compared with a somewhat similar calculation which assumed that straight line depreciation gave the correct net worth even under inflationary conditions. This calculation had to be broken out into two parts: working capital and fixed capital. For working capital the calculation was exactly as described above to allow for both the increased monetary value of the oldest project's working capital, and to allow for the fact that the working capital for subsequent investments has to be adjusted for its weighting in the total stream of

TABLE 6
Real Cash Flows and Economic Net Worth

Year	Project 1		Project 2	
	Cash Flow	Economic Net Worth	Cash Flow	Economic Net Worth
0	-49.46	49.46	-29.74	29.74
1	-59.35	112.77	-35.68	67.80
2	0.11	121.70	-1.95	75.17
3	19.00	112.43	5.00	76.18
4	18.00	103.43	6.00	76.27
5	17.00	94.70	7.00	75.38
6	16.00	86.28	8.00	73.41
7	15.00	78.18	9.00	70.28
8	14.00	70.44	10.00	65.90
9	13.00	63.07	11.00	60.17
10	12.00	56.12	12.00	52.99
11	11.00	49.61	11.00	46.23
12	10.00	43.57	10.00	39.92
13	9.00	38.06	9.00	34.12
14	8.00	33.11	8.00	28.85
15	7.00	28.75	7.00	24.16
16	6.00	25.05	6.00	20.09
17	5.00	22.06	5.00	16.70
18	4.00	19.82	4.00	14.03
19	3.00	18.41	3.00	12.15
20	2.00	17.88	2.00	11.13
21	1.00	18.31	1.00	10.02
22	19.78	0.00	11.89	0.00

investments and then adjusted for the amount of inflation from their project's start until the present time. For fixed capital its written down value was only increased by the growth factor (i.e., column 3); no adjustment was made for inflation (i.e., column 2) since it was assumed that straight line depreciation was appropriate for inflationary conditions.

With these calculations the net capital stock with fixed assets written down by the straight line method underestimates their value by 10% compared with

project 1 and by 29% when compared with project 2. The results of this and the previous section are summarised in Table 8.

Conclusions

It is almost certainly reasonable to reject the valuation of shares based on the historic worth of assets. Only a cash flow profile with an even more vigorous real decline in profits than the severe decline shown in project 1 could justify this conclusion. Conversely,

TABLE 7

Calculation of Current Value of Investments with the Same Cash Flow Profile as Project 1

<i>Economic Net Worth Without Inflation</i>	<i>Cumulative Inflation from Today to 1953</i>	<i>Companies Sector Capital Expenditure 1953 = 1</i>	<i>Current Value of all Investments</i>
49.48	1.0000	7.4643	369.2
112.77	1.1000	6.7857	841.7
121.70	1.1831	6.2159	895.0
112.43	1.2814	6.1984	893.0
103.43	1.3679	5.6254	795.9
94.70	1.4378	4.7555	647.5
86.28	1.5060	4.2540	552.7
78.18	1.5475	4.2873	518.7
70.44	1.6117	4.2127	478.2
63.07	1.6881	3.9063	415.9
56.12	1.7438	3.1921	312.4
49.61	1.7828	3.2397	286.5
43.57	1.8489	3.0857	248.6
38.06	1.9033	2.7016	195.7
33.11	1.9328	2.3825	152.4
28.75	1.9587	2.2762	128.2
25.05	2.0175	2.2063	111.5
22.06	2.0926	1.9222	88.7
19.82	2.2034	1.6381	67.2
18.41	2.2962	1.2413	52.5
17.88	2.3392	1.0651	44.6
18.31	2.3878	1.0000	43.7
			8139.9

project 2's cash flow profile goes to the other extreme and it is difficult to imagine a cash flow, net of inflation, having a longer period of increasing profits of the same level of increase, relative to the project's life. The mid point valuation for projects 1 and 2 is 327, which is not significantly different from the valuation based on conventional inflation accounting adjustments. The obvious weakness of the analysis has been the failure to bring land explicitly into the model because of lack of data. Inclusion of land would, *a priori*, have increased the differential

between the historic and actual values, although the investigation reported by D. A. R. Forrester in the Spring 1974 edition of *Accounting and Business Research* should make one careful of *a priori* reasoning as it indicated that on break-up firms achieved no more for their land than its book value.⁸

Moreover the ratio of depreciation to net fixed assets in the companies' accounts summarised in Table 2 implies an average write-off period of well

⁸The very small sample and size of firms should be noted.

TABLE 8
Implied Value of F.T. Index of Industrial Shares (February 1974)

<i>Market Value</i>	<i>Historic Cost</i>	<i>Conventional Inflation Accounting</i>	<i>'Project 1'</i>	<i>'Project 2'</i>
316.5	229	339	267	387

under 17 years. Since this is probably too quick a write-off this will result in an underestimation of the net value of fixed assets. On the other hand, Table 2 shows that working capital is 75% of fixed capital. The final ratio in this analysis was just under 50%; a 50% increase in the model's working capital would have decreased the differential between historic and actual values.

It should also be noted that the net capital stock for the companies' sector produced by the CSO excludes land, although it includes buildings. The exclusion of land will bias the differential between historic cost and replacement cost downwards. On the other hand this will be at least partly compensated for by the very long life assumptions used in writing down assets by the CSO which are almost certainly too long.

Probably the least that can be said on the basis of the analysis adopted is that it would be unwise to assume an underlying value of the index significantly in excess of 350 for the first quarter of 1974. This is not an insignificant conclusion given the previous annual peak of 503.8 in 1972.

Appendix

Dividend Growth and Shareholders' Return

This appendix proves that if investors obtain an initial dividend d on a unit of investment and the dividend increases at a rate g then the return to the shareholder is $(g + d)$.

Formally we need to prove:

$$1 - \int_0^\infty \frac{de^{gt}}{e^{(g+d)t}} dt = 0 \quad (1)$$

$$\begin{aligned} (1) &= 1 - \int_0^\infty de^{-dt} dt \\ &= 1 - d \left[-\frac{1}{d} e^{-dt} \right]_0^\infty \\ &= 1 - d \left[-\frac{1}{d} e^{-\infty d} + \frac{1}{d} e^{-d0} \right] \\ &= 1 - d \left[0 + \frac{1}{d} \right] \end{aligned}$$

Individual Purchasing Power Indices and Accounting Reports: A Comment on a Suggestion by Professor Gynther

M. Bromwich

This note analyses some of the arguments which Professor Gynther used to support one of his suggestions in a recent article in this journal,¹ that past and present changes in the general price level are irrelevant to the individual and therefore should not form the basis of accounting reform. It also examines his consequent view that to 'express past profit and asset figures in current prices for comparison purposes, each user can use the price index that he believes most relevant to him'.²

The aim of this comment is not to advocate using general indices to adjust historical cost figures. (I support Professor Gynther's views of the inadequacy of the resultant information for decision-making purposes.) Rather it will be argued that to reject measurement systems based on general purchasing power, as Professor Gynther seems to advocate, because they fail to yield a guide to individual 'well-being' or utility is to forego their advantages for measuring the entity's ability to undertake exchanges in the market.

General Purchasing Power and Individual Utility

Professor Gynther's crucial assertion seems to be that 'people . . . do not *see* themselves holding "general purchasing power" when they have money in their pockets; they *see* themselves holding specific purchasing power for those relatively few things . . . that they are likely to buy'.³ He argues therefore that 'no unit of measurement based on general pur-

chasing power can exist at a point in time'.⁴

This conclusion and Professor Gynther's solution to the problems of inflation adjusted accounts suggest that he wishes purchasing power to measure the utility or 'well-being' the individual obtains (or could have obtained) from his wealth and income. He argues quite correctly that general purchasing power can never serve this role.⁵ However, a review of the recent literature suggests that this is understood by, at least, the more careful general purchasing power advocates.⁶ Even with a perfectly competitive economy in equilibrium, only the utility attached to the marginal unit of money from each individual's given endowment will be equal for all. Intra-marginal units must yield varying utility to different individuals otherwise no trade would ever take place. There is no disagreement with Professor Gynther if this is what he is alluding to when he says that money does not have a common meaning to all people.⁷

Some general purchasing power advocates seem to have in mind a rather different role for general purchasing power. This is to summarise for the individual his ability to undertake exchanges in the market. The existence of money curtails the need to work out exchange ratios between physical goods but it is these latter prices which fundamentally concern the individual who wishes to trade in the market. An individual's purchasing power indicates the extent to which his choices are constrained by the size of his endowment of resources. In contrast, an assessment of the utility associated with this endow-

¹Reg S. Gynther, 'Why Use General Purchasing Power?', *Accounting and Business Research*, No. 14, Spring 1974, pp. 141-157.

²Gynther, p. 151. In fairness to Professor Gynther it must be stressed that he indicates that his article does not contain a full exposition of his ideas for accounting reform which will be given in a later article.

³Gynther, pp. 142-143.

⁴Gynther, p. 144.

⁵See, for example, W. J. Baumol, *Economic Theory and Operations Analysis* (2nd edition), Prentice Hall, 1965, pp. 202-205 and the references cited by Professor Gynther.

⁶See, for example, R. J. Chambers, 'Measurement in Accounting', *Journal of Accounting Research*, Vol. 3, No. 1, Spring 1965, esp. p. 39 and pp. 43-44.

⁷See Gynther, p. 144.

ment requires knowledge of the individual's tastes and preferences. With this view, it would seem perfectly legitimate to use a general purchasing index to compare the possibilities for exchange in the market available to the individual at separate points in time. Such calculations are not meant to say anything about the change in an individual's 'well-being' over the period concerned. This depends on how specific prices and his utility function have changed over the period being considered.

Professor Gynther's disagreement with the use of general purchasing power flows directly from his crucial assertion (presented earlier) for which he provides neither empirical evidence nor *a priori* justification. Narrowly interpreted, Professor Gynther's assertion might mean that people have a fixed and constant pattern of preferences which they indulge to a more or less degree depending on their changing fortunes through time. This view of behaviour removes the foundations from accepted micro-economic theory and denies people one method of improving their welfare. Micro-economists and general purchasing power theorists share the opposite assumption that the individual can maximise his welfare using the market only if he considers *all* possible trades open to him, subject to the cost of discovery being less than the benefits gained. The two opposing views can be judged only following carefully formulated empirical tests but history and the economics literature suggest that people do change their purchasing patterns over time.

A more liberal interpretation of the assertion would be that people consider only the prices of 'those relatively few things (out of the huge range of available goods and services) that they are likely to buy'.⁸ This begs the question of how the individual originally selects his 'relatively few things' or why alterations in this original selection occur. Without such an understanding it is difficult to see how an individual could construct his own specific purchasing power index. Moreover, it is difficult to believe that a review of alternative possibilities does not play a part in these choices however they are decided.

Prices and the Individual

Professor Gynther's second attack on general purchasing power is founded on the observation that different people often face a variety of prices for seemingly identical commodities. He argues that purchasing power cannot therefore be generalised for people conceive differently the purchasing power of a given sum of money. Accepted economic theory

does not require that goods which seem to be identical should sell for the same price. His observation that 'in some places, prices of identical commodities even vary significantly between working-class suburbs and top executive suburbs in the one city'⁹ may well be explained by the differential environment and services offered by shops in the two suburbs. If not trading could profitably take place. Alternatively, different prices may be explained by differential transport costs.

Economists would probably expect to be able to find similar economic attributes to explain most observed differences in the prices of seemingly identical goods except in the presence of either local market power or spatial price discrimination. But certainly much empirical research is required in this area. In any case, it is not clear that the arguments of those favouring general purchasing power fall if people face different prices not justified by economic factors, unless changes in these non-economic factors, which are likely to reflect relatively stable influences, cause affected prices to move differently to the general price level index over time.

Specific Price Indices and Decision-Making

One possible ground for supporting the use in accounting of indices based on general purchasing power rather than indices specific to the individual is that the former are consistent with the normal decision models in the literature. No different conduct in decision-making is required of the man who spends all his money on jam to that expected of an individual with catholic tastes. Both are normally seen as seeking to allocate their limited resources so as to maximise their welfare.

If the proceeds of decisions are represented by cash inflows in the future, the individual, to decide between opportunities, will need to render sums to be received at different points in time comparable using an index of some type. He may make sub-optimal choices if he uses an index reflecting only the expected movements of the prices of his preferred goods. Instead, with a reasonably perfect capital market, he should seek to make decisions which maximise over time the amount of resources he obtains to trade on the market, and should therefore use a general price index to render such sums comparable.

He can borrow or lend on the market to achieve his desired cash flow pattern if expected relative price changes render non-optimal the inflows accruing from his resource allocation plans derived using the above procedure. By operating in this way

⁸Gynther, pp. 142-143.

⁹Gynther, p. 143.

he should do better than had he made his decisions directly bearing in mind the forecast relative prices of his preferred goods.¹⁰

Thus, using general price level indices to adjust accounts should be of use to most people both for monitoring their resource allocation plans and for aiding in prediction of how entities will respond to general price level changes at least to the degree that considering historical results can ever aid prediction.

Measurement in Accounting

Professor Gynther's final thrust against general purchasing power indices is that general purchasing power is not a unit of measurement as usually understood. Measurement theory is a very complex subject and all that is intended is to present in an amateur way one or two possible arguments seemingly overlooked by Professor Gynther. He argues that money is not a standard unit like metres or kilograms – it belongs neither to that class of measures which have 'a common meaning to all people' nor to that set of 'precise things that can be checked by all (like the measure of a metre in Paris)'.¹¹ One might suggest that even these latter measures often have 'common' significance across the population only once a given task is specified. For example, the physical meaning of a metre to the pilot of an aircraft might differ from that attached to the measure by a small child considering his size relative to that of his 'huge' parents. A commonality of views becomes much more likely if they are both using the metre when attempting to measure the size of a carpet (especially if they are both measuring the same carpet for identical purposes).

In an earlier section it was suggested that the money available to an individual at any point in time measures what the individual has to exchange in the market – it summarises the alternative collections of goods available to him. Chambers and others have claimed that this is a recognisable measurement process and have pointed out that equivalent transformation operations to price level adjustments have to be undertaken even in the supposedly more precise physical sciences when measures are used in situations which violate the conditions embedded in their definition.¹²

One possible answer to insistence on a precise standard is to suggest that it does exist but that most of us do not have the imagination required to visualise it. A possible equivalent for purchasing power to, say, the standard metre, is a vector of all those commodities which could be bought using a given sum of money – an abstract which it is difficult to grasp.

It may be that Professor Gynther's criteria for the

ACCOUNTING AND BUSINESS RESEARCH

acceptance of a measurement system are too rigorous. Basically, measurement, as I understand it, represents a more or less quantitative method of classifying items according to a given property. One often used criterion for the acceptance of a measurement system is whether its utility exceeds its cost subject to the constraint that no other system offers a relatively better performance.

A cursory glance at the world suggests that many people do find general purchasing power measurement systems useful for many different purposes. One doubts whether the benefits of specific purchasing power systems, unless constructed in a very rough and ready way, can justify the very substantial cost of constructing and using a measurement system.

A Specific Purchasing Power Solution to Inflation Accounting

We finally turn to considering the utility of Professor Gynther's solution to the price level adjustment problem in accounts.¹³ He suggests that inter-period comparisons of resources can best be done 'by comparing *specific values* of those assets that *were* actually purchased by companies. To do this the specific values as at past dates need to be expressed in present day prices – i.e., with the aid of an index relevant to the person making the comparison'.¹⁴

Our concern here is not with the propriety of the underlying assumption that a profit should be declared only when the operating capacity of the entity has been maintained,¹⁵ though this view does impute a specific type of preference to the investor. Rather we address ourselves to the use of individual indices to restate the specific values of assets. We adapt Table 2 of the original article which gave for a parcel of land owned by a given individual its present values and current market prices after holding the land for 3 and 4 periods.

¹⁰This is not to argue that expected changes in relative prices do not impinge on resource allocation decisions but rather that, for example, those changes relating to the goods consumed by a given individual should not affect investment decisions unless the capital market is extremely imperfect.

¹¹Gynther, p. 144.

¹²See, for example, R. J. Chambers, *op cit.*, especially p. 35 and M. Moonitz, 'Price Level Accounting and the Scales of Measurement', *The Accounting Review*, Vol. XLV, No. 3, July 1970, pp. 465–475; especially pp. 471–474.

¹³Gynther, esp. pp. 143 and 146–148.

¹⁴Gynther, p. 147.

¹⁵For one view of this assumption see W. T. Baxter, 'General or Special Index – Capital Maintenance under Changing Prices', *Journal UEC* (the European Journal of Accountancy), Issue No. 3, July 1967, pp. 172–181.

TABLE I¹⁶

Item	Present values	Current market prices
	\$	\$
1. Specific value at Time 3	64,000	45,000
2. Specific value at Time 4	105,000	90,000
3. Time 3 specific values expressed in year 4 prices:		
(i) Assuming general price level index used for restatement, time 3 = 100, time 4 = 266	144,000	120,000
(ii) Assuming index relevant to the owner:		
(a) has risen from 100 at time 3 to 300 at time 4	162,000	135,000
(b) has risen from 100 at time 3 to 150 at time 4	81,000	67,500

The second column of the table indicates that those accounting reformers who wish to incorporate both specific and general price changes in accounting statements would record a loss for the period of \$30,000 (\$90,000 - \$120,000) resulting from holding land, the price of which had risen by less than the general level. The main argument in Professor Gynther's original article that general price level adjustment to historical accounts may yield misleading results is amply demonstrated by the unrealised holding gain of \$75,000 recorded by this system (\$120,000 - \$45,000 (assumed to be the original cost)). His preferred alternative, as I understand it, would produce a loss for the individual represented by line 3 (ii) (a) of the difference between the actual market value at time 4 and what he requires to preserve his ability to buy the goods he could have bought at time 3, i.e., \$135,000 - \$90,000 = a loss of \$45,000. Similar calculations for the individual represented by line 3 (ii) (b) indicate an unrealised gain of \$22,500.

None of the above calculations is directly relevant to decision-making. In a perfect capital market, line 2 gives all the information required for this purpose — the land should be retained. Professor Gynther says that 'there is no useful purpose in comparing the general purchasing power of dollars invested in assets over time'.¹⁷ However, comparison between

line 2 and line 3 (i) indicates that both the individual's forecasts and those of the marginal actors in the market have been revised downward, and in the situation we are considering his ability to conduct exchanges in the market has been reduced. Although this comparison does not yield a quantitative guide to the individual's 'well-offness', it does signal that the expected cash flows from the investment have declined. It also treats past price changes in the same way as future alterations in prices in capital budgeting calculations should be treated. Knowledge of the changes in market prices may enable the decision-maker to consider the validity of his own forecasts. An analysis of the reasons for the alterations in market prices may help him in his predictions.

The figures in lines 3 (ii) (a) and (b) cannot be used in this way for this would confuse the effects of altered forecasts concerning the asset under consideration with alterations in both the relative prices of the goods the individual consumes and in his tastes.

Assuming that the index used can correctly reflect the individual's utility function, a comparison between line 2 and, for example, line 3 (ii) (a), does indicate that his 'well-offness' has declined. At time 4 he can consume less of his preferred goods than at time 3. Such knowledge might improve his future decision-making (though it is not clear how). However, a similar comparison for the individual represented in line 3 (ii) (b) would suggest that he could consume \$22,500 and still leave his opening wealth intact. But this assumes that the relative prices of the goods he consumes will not move more in sympathy with the general price level in future. Moreover, these comparisons, if not used with care,

¹⁶Gynther, p. 148, Lines 1, 2 and 3 (i) are contained in the original table, but we have omitted the equivalent figures per acre and have taken the base of the general index as 100 rather than 75. Lines 3 (ii) (a) and (b) reflect the change in the prices of the landowner's preferred goods for two different sets of preferred goods.

¹⁷Gynther, p. 147.

may mislead an investor facing capital rationing, for assuming that the returns from other investment alternatives available to him move more in line with the general price level, he might consider selling his land and reinvesting in these opportunities.

Our table suggests that if accounting statements reported specific asset prices at a given time adjusted by the general price level index, this would not inhibit the individual who wished to apply Professor Gynther's procedures. He would experience no more

ACCOUNTING AND BUSINESS RESEARCH

difficulty in restating these figures using his own purchasing power index than he would working with the unadjusted specific value figures. It is believed that Professor Gynther's reasoned advocacy, maintained over a long period, of the use of specific values rather than historical cost figures represents a substantial contribution to accounting reform. His views relating to specific purchasing power are unnecessary to this case and may, if not interpreted carefully, hinder its acceptance.

Comparative Returns for Institutional Property Investors

V. Fieldgrass

Introduction

The finance of property development has evolved over the years in response to changing market conditions. Traditionally the source of finance was through a straight mortgage provided by an institutional investor, who was able to secure a fixed return against the completed development. As interest rates rose the developer often preferred to share the growth in the property with the institution in return for a lower rate of interest on borrowing. This was originally achieved through leaseback finance, which eventually gave way to the more equitable side-by-side sharing arrangement. On this basis the fund would provide finance at a fixed rate and also receive a proportion of any additional return over the fixed rate. This type of arrangement was illustrated by the line of finance negotiated in 1969 between Hammerson Property and Standard Life under which the institution was to receive a 6½ per cent return on funds invested together with a 40 per cent share in the equity of the developments.

The terms of sharing arrangements have varied with monetary conditions (the availability and cost of finance) and the state of the property market (such as yield levels and the supply of investment property for sale). Often, individual factors may have an overriding influence on the rates agreed between the parties. Thus during 1972/3, when there was a shortage of investment property in relation to institutional demand, funds were prepared to share a property investment with the developer in exchange for a relatively small premium (of about one percentage point) over the yield on a direct investment. Conversely, since the end of 1973, the supply/demand balance has altered. Development activity has been reduced by development gains tax and the liquidity problems of developers have led to a surplus of property coming on to the market. In these circumstances there is little incentive for the institu-

tion to share the equity in the property through development financing, when there are ample standing investments from which to choose.

However, regardless of market conditions there remain three basic options available to the institution who wishes to make an investment secured against property: directly purchasing the property, lending money at a fixed rate secured by way of a mortgage charge or thirdly a variable return linked to the rental value of the property through a funding scheme.

Market conditions and the level of confidence will affect the popularity of either of these alternatives but the institutional investor taking a long term view should consider these factors to be of less relevance than the overall return that can be achieved by the alternative methods. It is, therefore, suggested that funds who have taken the view that property is a suitable security against which to invest should have regard to the optimum return that can be attained by the different ways of making such an investment.

The purpose of this article is to illustrate a method of comparing the overall returns that can be achieved through each of the above options. The overall return can be measured under a particular assumption of rental growth. It is possible to compare the various returns directly by making this same assumption for each alternative. In this way the institutional investor can contrast the market yield on investment property with the interest rate on mortgage finance and compare these with the return that he can achieve through an equity sharing arrangement.

Funding vs. Mortgage – an Initial Approach

The initial rates of return available for funding will be determined by the market and by the negotiating

position of the parties involved in the transaction. However, the eventual return on funding will be dependent upon the variations in rental value. In respect of future changes in rental value the negotiating parties may have different views and it will be necessary to calculate the overall return on the basis of such views. In calculating the returns available there will, therefore, be certain fixed factors not subject to negotiation because they are governed by market influences: for example, the interest rate on mortgage finance, the period of the loan and gap between rent reviews. Those factors subject to variation will be the guaranteed base rate and the portion of rental income paid to the investor.

On different assumptions of rental growth it is possible to show which set of variables will give the best return in money terms compared with a particular rate of interest on a mortgage loan.

For fixed rate investment to offer a higher return than equity sharing the following conditions must be satisfied:

$$I_1 - I_2 > f \times R \left(\frac{n}{m} \times \frac{1 - (1+g)^m}{1 - (1+g)^n} - 1 \right) \quad (1)^1$$

Where I_1 = Fixed interest return.

I_2 = Base rate guaranteed on funding.

R = Rental return on development.

f = Proportion of rent retained by investor over rental return, R .

m = Period of loan.

n = Years between rent review.

g = Annual growth in rental income.

The table below shows the break-even difference between I_1 and I_2 for different values of f , R , g .

f	R	g		
		5%	10%	15%
0.5	7½%	2.7	8.3	19.9
	10%	3.6	11.1	26.6
	12½%	4.5	13.9	33.2
0.3	7½%	1.6	5.0	11.95
	10%	2.2	6.9	15.9
	12½%	2.7	8.3	19.9
0.1	7½%	0.55	1.7	4.0
	10%	0.7	2.2	5.3
	12½%	0.9	2.8	6.6

For example, an institution might have the opportunity of lending money out on a 25 year

¹See Appendix 1.

ACCOUNTING AND BUSINESS RESEARCH

mortgage at 16%. A developer trying to raise long term finance might be prepared to offer the investor 30% of any rent received in excess of the initial development return with a guaranteed 11% on his outlay. Assuming that the development is only providing a 7½% return on cost the table shows that it is only worth the investor's funding on these terms if he is anticipating rental growth of more than 10% p.a. because otherwise the loss of income (initially 5%) will not be made up over the 25 year period.

Funding vs. Mortgage – a Further Investigation

There are two main disadvantages of reaching a decision on the above basis. Firstly, it tends to underestimate the relative benefits of fixed interest finance because it does not allow for the fact that the extra income in the earlier years can be reinvested. The other problem is that it ignores the sharing in any increase in capital value of the property upon disposal at the end of the period.

Formula (1) can be refined to compensate for these two factors by taking the present value of a summation *ad infinitum* of the income flow from an equity sharing funding arrangement and comparing this with the present value of a fixed interest irredeemable loan:

Thus:

$$I_1 - I_2 > f \times R \left(\frac{(1+g)^n - 1}{(1+d)^n - (1+g)^n} \right) \quad (2)^2$$

Where d is the appropriate discount rate.

Funding vs. Purchasing

Funding on an equity sharing basis provides an intermediate course between fixed return and an equity investment. The above discussion has been designed to compare the merits of a fixed return and an equity sharing investment on the basis of income flow. The object of the exercise was for the investor to compare the interest rate on a loan with the base rate on funding, under various assumptions of return on development and growth in rental income.

When purchasing a property the investor will be more concerned with an overall return on his investment, in order to compare this with other types of investment such as shares or fixed interest securities.

The overall return is given by:

$$d = Y + G, \quad (3)^3$$

Where d = The overall return.

Y = The initial yield.

²See Appendix 2.

³See Appendix 3.

G = The annualised growth in rental value (i.e. a figure that reflects a compound growth in rental value while allowing for the fact that the rental increments only take place at each rent review).

It is not possible to present a linear equation to measure the overall return on an equity sharing funding because of the reverse gearing to the funding institution, e.g. funding at 6% guaranteed plus 50% of rent over an 8% return on cost; initial return on cost 10%; annualised rental growth 10%.

	Fund Receives (%)	Increase in income (%)
Initially	7.0	
1st period 10% growth	7.5	7.1
2nd period	8.05	7.3
3rd period	8.66	7.6

The fund's percentage increase in income gradually rises until it approaches the underlying rate of rental growth.

The overall return can be assessed by using a quadratic formula, as shown in Appendix 4. The resulting equation for calculating the overall return is given by:

$$d = \frac{1}{2} \left\{ b + G + F(i-s) + \sqrt{(b+G+F(i-s))^2 - 4G(b-Fs)} \right\} \quad (4)$$

The table below illustrates the returns available under the above funding arrangement assuming development returns of 8% and 10%, and annualised rental growth of 5% and 10%.

This is compared with a standing investment yielding 5%.

	Overall return for:	
	Standing Investment	Development Return
Rental growth		8% 10%
5% p.a.	10%	10% 11.1%
10% p.a.	15%	14.6% 15.7%

It is apparent that the investor is better off to share the equity if he expects a 10% development return, whereas on an 8% return he would purchase the standing investment if he could not negotiate better terms with the developer.

Conclusion

The above investment strategy depends for its success upon the significance of an assessment of rental growth. If such an assessment is made then it is

practical to have an objective measure which compares the fixed rate of return determined by the market in mortgage loans with the more negotiable rate for funding schemes. Similarly the overall return on a property purchased, as measured by the market yield for such a property together with an assumption of rental growth, can be compared with the overall return on funding under the same growth assumptions.

The method can obviously be refined to allow for more sophisticated schemes of property financing and investment and is generally applicable to any investment that provides an income flow.

Finally, if the investor finds it difficult to assess the growth in rental or other kind of income with any degree of confidence, it is possible to turn the whole equation around and by feeding in values for other variables come out with the rate of rental growth for the investment chosen. He can then decide whether he finds this growth rate too high or too low to invest in at the rates under consideration.

Appendix 1

The income per unit of investment from a fixed interest loan over m years is given by $m I_1$, where I_1 = the rate of interest.

The income from funding is given by the summation:

$$\begin{array}{l|l} \text{Years 0 to } n-1 & n \times f(R(i+g)^0 - R) + I_2 \\ \text{to } n & + \\ \text{to } 2n-1 & n \times f(R(i+g)^n - R) + I_2 \\ \text{to } m-n & + \dots \\ \text{to } m-1 & n \times f(R(i+g)^{m-n} - R) + I_2 \end{array}$$

Where n = Number of years between review.

R = Rental return on development.

f = Proportion of rent retained by investors over rental return, R .

g = The annual growth in rental income.

The sum is given by:

$$n \times f \times R \left(\frac{1 - (1+g)^m}{1 - (1+g)^n} - \frac{m}{n} \right) + mI_2$$

Therefore, for the return on a fixed interest loan to be greater than through funding the following relationship must obtain.

$$mI_1 > n \times f \times R \left(\frac{1 - (1+g)^m}{1 - (1+g)^n} - \frac{m}{n} \right) + mI_2$$

$$I_1 - I_2 > f \times R \left(\frac{n}{m} \times \frac{1 - (1+g)^m}{1 - (1+g)^n} - 1 \right)$$

Appendix 2

The present value of the income return is shown by the sum to infinity of:

$$\begin{aligned} \text{Year } 0 & \left| f \left(R \times \frac{(1+g)^0}{(1+d)^0} - \frac{R}{(1+d)^0} \right) + \frac{I_2}{(1+d)^0} \right. \\ & \quad \left. + \dots \right. \\ \text{Year } 1 & \left| f \left(R \times \frac{(1+g)^1}{(1+d)^1} - \frac{R}{(1+d)^1} \right) + \frac{I_2}{(1+d)^1} \right. \\ & \quad \left. + \dots \right. \\ \text{Year } n & \left| f \left(R \times \frac{(1+g)^n}{(1+d)^n} - \frac{R}{(1+d)^n} \right) + \frac{I_2}{(1+d)^n} \right. \\ & \quad \left. \text{Etc.} \right. \end{aligned}$$

Where d = the discount rate applied to future income.

Therefore for fixed interest to provide a greater present value

$$\begin{aligned} I_1 \frac{(1+d)}{d} > f \left(R \left(1 - \frac{1}{(1+d)^n} \right) \frac{(1+d)}{d} - \frac{R(1+d)}{d} \right) \\ & \quad \frac{(1+g)^n}{(1+d)^n} \\ & \quad + I_2 \frac{(1+d)}{d} \end{aligned}$$

$$I_1 - I_2 > f \times R \left(\frac{(1+g)^n - 1}{(1+d)^n - (1+g)^n} \right)$$

Appendix 3

The value of the property is expressed as the present value of the sum of rental income *ad infinitum*.

Value = Present value of rent in year 1 +

Present value of rent in year 2 + ...

V = Value.

R = Rent in year 1.

d = Discount rate (equals the overall return).

G = Annualised growth in rental income.

$$V = \frac{R}{1+d} + \frac{R(1+G)}{(1+d)^2} + \dots$$

$$V = \frac{R}{d-G}$$

$$d - G = \frac{R}{V} \text{ but } \frac{R}{V} = \text{Yield on initial rent (y)}$$

$$\therefore d = Y + G$$

i.e. Overall return = Initial yield + Rental growth.

Appendix 4

Fund receives return of £B (the base rate), plus F% of any income over £S. The development shows a return of £I. G% is the annualised rental growth, and d% is the discount rate (i.e. the equivalent to the overall return).

Value = Present value of rent in year 1 + ...

$$V = \frac{B + F(I-S)}{(1+d)} + \frac{B + F(I(1+G) - S)}{(1+d)^2} + \dots$$

$$V = \frac{B}{d} + \frac{FI}{(d-G)} - \frac{FS}{d}$$

Divide through by V:

$$\text{Let } \frac{B}{V} = b\%, \frac{I}{V} = i\%, \frac{S}{V} = s\%$$

$$i = \frac{b}{d} + \frac{F_i}{(d-G)} - \frac{F_s}{d}$$

$$d(d - G) = b(d - G) + Fid - Fs(d - G)$$

$$d^2 - (b + G + F(i - s))d + G(b - Fs) = 0$$

This is a quadratic in d the roots of which are given by:

$$d = \frac{1}{2} \left\{ b + G + F(i - s) \pm \sqrt{(b + G + F(i - s))^2 - 4G(b - Fs)} \right\}$$

(The overall return to the fund is given by adding the formula under the root sign.)

Oil Company Accounts: Not so comparable?

J. W. H. Trueman

In a recent study into the comparability of oil company accounts,¹ Professor Kenneth S. Most sets out to answer the question 'does the use by major oil companies of different accounting principles and methods render the financial statements of those companies non-comparable?' He found that the nature and extent of permitted differences is sufficient to establish a *prima facie* case for non-comparability, but then, after analysing the accounts of a selected sample of seven major companies (Exxon, Texaco, Gulf, ARCO, Phillips, Union and Getty), he concluded that comparisons are not impossible. He stated his conclusion as follows:

In short, a skilled analyst can use the financial reports of these seven major oil and gas companies as a point of departure for arriving at judgements on solvency, profitability and stability of earnings to the same extent as in any other inter-firm comparison and is not noticeably handicapped by the variety of accounting principles and methods used by the companies.²

This is a startling and quite unexpected result. It implies that the controversy which has raged during recent years regarding the inconsistencies in accounting treatment for transactions of an essentially similar nature has been futile, and further implies that any movement towards greater uniformity in accounting principles and presentations within the oil industry will not result in more meaningful financial statements.

The purpose of this paper is to question Most's conclusions on the grounds that they are not compatible with the results of a study of major oil companies carried out by the writer, in which the accounts of seven companies (BP, Burmah, Gulf,

Mobil, The Royal Dutch/Shell group, Tenneco and Texaco) were compared. The writer's sample and Most's sample were chosen independently, but two companies, Gulf and Texaco, were common to both studies.

The writer's study was restricted to the specific topic of accounting for the exploration and development costs of oil production operations, and is thus of more limited scope than Most's study. But since this one item comprises the single most important source of difference between the accounting systems of oil companies an investigation of this aspect would seem sufficient to enable conclusions to be drawn as to the comparability of oil company accounts. The evidence examined does in fact raise serious doubts as to the validity of Most's results and highlights the dangers in any attempt at generalising from them.

Exploration and development costs

1. The Capital/Expense Decision

The capital/expense decision for exploration and development costs is a major area of accounting policy and is the basis upon which oil producing firms can be classified into 'full cost' and 'successful effort' companies. At one extreme lie those strict full cost companies which capitalise all exploration and development expenditure incurred anywhere in the world and at any stage of the exploration and development process. At the other extreme are those successful effort companies which refuse to capitalise any item of expenditure unless it is directly associated with an individual productive well. The extremes reflect a basic difference in attitude towards the process of oil discovery. The full cost companies operate on the principle that the world-wide search for oil can be looked upon as one vast project, and hence that the total cost of all exploration and development work constitutes the investment in oil bearing deposits. Under this philosophy the cost of dry holes,

¹Kenneth S. Most 'A Comparative Study of the Accounts of Seven Major Oil Companies' *Accounting and Business Research* No 16 (Autumn 1974), pp. 242-250.

²Ibid, p. 248.

which are unavoidable costs of the search for oil, is capitalised as part of the costs of any oil that is found and is not expensed. In contrast, the successful effort companies treat individual fields, wells or other small units as separate projects. Costs incurred at one location are not matched against revenues from other locations, but are capitalised or expensed according to whether the location at which they are incurred is productive or non-productive.

Accounting practice in the majority of companies falls between the two extremes of strict 'full-cost' and 'successful effort' outlined above. As Table 1 shows, the most extreme positions amongst the writer's sample were taken by Tenneco (full cost) and the Royal Dutch/Shell group (successful effort), with Gulf, Mobil and Texaco following less extreme versions of the 'successful effort' line. BP and Burmah based their capital/expense decisions on characteristics of the production area rather than the expenditure, but this too can be classified as a variation on the 'successful effort' method.

In addition to the considerable differences in capital/expense policy, with consequent differential impact on profits and assets, as revealed in Table 1, there appear to be certain ambiguities and anomalies in the methods disclosed which make the reliability of comparisons questionable. The Royal Dutch/Shell group, for example, reported that their exploration costs are charged to income, and that

Intangible expenditure directly attributable to exploration wells, and treated as exploration expenditure when incurred, is capitalised when such exploration wells are found to be productive and is then depleted on the unit-of-production

basis.³

This suggests that when a well is proved productive, expenses which were written off in previous years are written back. The treatment of the resulting credit item is not disclosed. Further, the Royal/Dutch Shell group accounts gave no indication that this policy is not followed throughout the group; yet the major US operating subsidiary, Shell Oil Company, whose sales amount to 15 per cent of the total sales of the group, simply reported the expensing of all exploration costs without any mention of possible write-backs.

It must be concluded that either the accounting treatment of exploration costs is not consistent within the group and that this was not disclosed in the accounts of the holding company, or the accounting treatment is consistent but was not fully disclosed in the accounts of the subsidiary.

As a second example of ambiguity we may take the policy description in the accounts of BP:

Exploration properties are written off over the estimated period of exploration and full provision has been made against the group's proportion of other exploration expenditure in non-proven areas.⁴

On one reading this suggests that exploration in proven areas is written-off over the period of exploration whilst that in non-proven areas is always fully provided against. This is the reading adopted in Table 1. An alternative reading suggests that explora-

³Shell Transport and Trading Company Limited, 1973 Annual Report, p. 28.

⁴British Petroleum Company Limited, 1973 Annual Report, p. 26.

TABLE 1
Exploration and Development Costs

Company	Expensed	Capitalised
BP	In non-proven areas	In proven areas
Burmah	In countries where commercial production has not been achieved	In countries where commercial production has been achieved
Gulf	Unsuccessful effort. All survey costs, delay rentals and dry hole costs	Successful effort
Mobil	All survey costs, and delay rentals All unsuccessful effort	Successful and unproven effort
RD/Shell, Shell Oil	Non-productive and non-proven costs	Cost of productive wells
Tenneco	None	All
Texaco	Intangible dry hole costs, US lease rentals	All other

Source: Annual reports for years ended in 1973 (Tenneco Inc, 1972).

tion properties are always written off over the exploration period, but that other exploration expenditure is fully provided for in non-proven areas and not fully provided for in proven areas.

Texaco's accounts provide a third example of ambiguity. The relevant part of the 'Description of Significant Accounting Policies' reads as follows:

... costs related to the exploration for and development of oil and gas reserves are capitalised and amortised, with the principal exceptions of expenditures in the United States for lease rentals and for intangible drilling costs applicable to dry holes, which are charged to expense as incurred.⁵

This statement does not clearly indicate whether it is US lease rentals and US dry hole costs, or US lease rentals and all dry hole costs which are expensed.

Table 1 has been prepared on the assumption that all dry hole costs are expensed, but the other possibility must be borne in mind.

It has been noted previously that Texaco was included in both the writer's and in Most's samples. But Most has interpreted the above policy description to mean that Texaco follows a fairly extreme form of full cost accounting, and describes the company as 'a known full coster', whereas in fact it acts as a successful effort company so far as US lease rentals and dry hole costs are concerned, and may be closer to the typical 'successful effort' company

than to the strict 'full cost' model.

Table 2 gives details of the exploration costs incurred by each company in the writer's sample during accounting years ended in 1973, together with the net book value of each company's oil field properties (including all-unamortised exploration and development expenses) at that year end. The table illustrates the effects of different capital/expense policies. For example Gulf capitalised 75%, Mobil 89% and Tenneco 100% of their respective exploration expenses. Texaco did not capitalise any costs on non-producing properties although at least four of the other companies (BP, Burmah, Gulf and Tenneco) did so. These differences reflect the impact of different accounting policies rather than differences in the success rate of exploration efforts.

Perhaps more importantly, Table 2 illustrates that difficulties of analysis and comparison are caused by inconsistencies in cost classifications between companies and by incomplete disclosure of accounting policies. Many of the required figures cannot be ascertained from the published accounts. The reader is, perhaps, able to make a few rough subjective assessments but is not provided with the information which would be necessary for accurate or detailed comparisons between the companies to be made.

Thus, it seems almost certain that the total capitalised property costs of BP are far less than would be the case if that company had followed the accounting methods of, say, Mobil, or Gulf, or Tenneco, and it can be inferred from this that the rate

⁵Texaco Incorporated, 1973 *Annual Report*, p. 27.

TABLE 2

Company	Producing £m	Net book value of properties at year end, 1973		Total	Exploration Expenses, 1973		
		Producing	Non-producing		Expensed	Capitalised	% Capitalised
BP	£m	?	?	286	?	?	?
Burmah	£m	?	?	304 ^a	?	?	?
Gulf	\$m	?	?	5340	152	447 ^b	75%
Mobil	\$m	3938	?	?	147	1187	89%
RD/Shell	£m	?	?	?	149	?	?
Tenneco	\$m	?	?	1330	nil	?	100%
Texaco	\$m	7043	nil	7043	49	?	?

Source: As Table 1

'?' denotes a figure which, because of the classification system used, is not readily deducible from the published accounts.

^a Freeholds £45m, leaseholds £13m, unexplored leased areas £41m, areas of undeveloped but proved reserves £50m, other operating assets £155m.

^b Includes \$308m on non-producing properties.

of return on investment should be higher under BP's than under the alternative methods, but the difference cannot be quantified. This must surely leave the reader in a state of considerable uncertainty, not knowing how the rate of return in one company should be adjusted to make it comparable with that of another company. This uncertainty holds not only for the rate of return on the company's investments but also for all those other financial ratios which depend upon measures of capital investment and current expense.

2 The Amortisation Decision

Practice in respect of the capital/expense decision is by no means the only area of accounting policy in which oil companies differ. Each item of expenditure which is capitalised becomes subject to depreciation or amortisation, whereupon the company is faced with three choices, namely as to Amortisation Method (e.g. straight line or unit-of-production), Amortisation Base (e.g. proved reserves or developed reserves), and Cost Centre (e.g. well, field, country or world). This threefold choice is complicated by the possibility that any one company may use different methods for different parts of its operations. An example would be the widespread use of straight line time depreciation on properties situated in the Middle

ACCOUNTING AND BUSINESS RESEARCH

East, by companies which employ the unit-of-production method for all other producing properties.

Table 3 describes the amortisation policies followed by the writer's sample so far as those policies can be ascertained from the published annual accounts. The one clear fact to emerge is that, once again, practices differ. Six of the seven companies disclosed that they used the unit of production method in amortising their capitalised exploration and development costs, but three of these companies also used straight line depreciation, either in certain geographical areas (BP, Gulf) or for certain classes of expenditure (Mobil). The seventh company, Burmah, merely disclosed that its amortisation methods were 'dependent on local conditions'.

Only four of the companies disclosed their amortisation bases. Tenneco and Texaco employed measures of total reserves (the differences between Tenneco's 'total reserves' and Texaco's 'estimated recoverable reserves' may reflect nothing more than a difference in terminology), but Gulf used developed reserves and Royal Dutch/Shell used developed reserves for some costs and proved reserves for others. Developed reserves are oil deposits which can be extracted using existing equipment, while proved reserves are deposits on which exploratory work, but not development work, has been completed. Either of these

TABLE 3

Company	Amortisation method	Amortisation Base	Cost centre
BP	Producing property — unit of production — straight line in Middle East Exploration property — over the exploration period	?	Area
Burmah	Dependent on local conditions	?	Country
Gulf	Unit of production Straight line in Middle East	Developed reserves	Country
Mobil	Successful effort — unit of production Unproven effort — straight line	?	Field
RD/Shell, Shell Oil	Unit of production	Development costs — developed reserves Lease costs — proved reserves	Well
Tenneco	Unit of production	Total reserves	Production area
Texaco	Unit of production	Estimated recoverable reserves	US — well Non US — world

Source: As Table 1

measures will give a reserve quantity figure materially lower than any measure of total reserves.

Each company in the writer's sample disclosed its choice of cost centre, but here again there was no consistency in the methods. Five different cost centres (well, field, area, country and world) were found amongst the seven companies of the sample. One company, Texaco, was found to operate a dual standard under which costs in the USA were allocated to individual wells while costs in the rest of the world were treated on a world-wide basis.

Quantification of the effect of these different methods on the published accounts was not possible, one reason being that none of the companies published the necessary information regarding oil deposits; i.e. the estimated reserve quantities, the costs which had been and were to be written off as each reserve is depleted, and the amortisation method employed.

Shell Oil Company and BP were the only companies in the sample to disclose their worldwide reserves, and of these Shell Oil disclosed net proved reserves whilst BP disclosed net recoverable reserves.⁶ The other companies merely reported estimates of their reserves at specific locations. The Royal Dutch/Shell group, for instance, disclosed only the estimated recoverable reserves for one particular field, the Brent field in the North Sea.⁷ Of the sample companies, only Gulf came close to providing sufficient detail on oil reserves to make inter-firm comparisons of the effect of different amortisation policies possible. This company disclosed developed reserves in the United States, Canada, Latin America, and Africa. Unfortunately it did not disclose reserves in the Middle East and neither did it publish a breakdown of capitalised costs by country (i.e. cost centre) or by the divisions for which the reserves figures were given.

The variety of amortisation methods, bases, and cost centres would in itself be sufficient to cause difficulties in comparing the accounts of oil companies. In conjunction with the capital/expense choice the problems of analysis are doubly compounded. Not only do accounting policies often remain undisclosed, but even when they are disclosed the reader is not given sufficient information and so cannot make quantified comparisons between the companies.

⁶Reserves are classified as proved, probable, and possible according to the stage to which development work has been carried out. Proved reserves are reserves in fully explored fields. Recoverable reserves include proved, probable and possible reserves.

⁷Shell Transport and Trading Company Limited. 1973 Annual Report, picture caption on p. 23.

Inter-company comparisons

The difficulty of comparing like with like is clearly a major problem for those financial analysts and investors who seek to make inter-company comparisons from the published annual accounts of those major oil companies studied by the writer. Moreover, since all oil companies must face the capital/expense and amortisation decisions with their ranges of alternatives it seems unlikely that oil company accounts will be comparable until such time as a common approach is adopted.

This problem has been pointed out by several previous authors. For instance, Price Waterhouse & Company in their 1972 Survey of Oil Company Accounting Practices comment as follows:

Because of the different classifications of cost and varying disclosure of accounting treatment, it is not possible to produce a complete comparison of the cost treatment [of lease acquisition, exploration and intangible development costs] followed by the companies surveyed.⁸

The notes and accounting policy statements included in annual reports do not give sufficient descriptions of the accounting methods adopted by the reporting companies, and even where the descriptions are free from ambiguity they do not provide a sound base for the conversion of the accounts of several such companies into a common format. The ratio analysis employed by K. S. Most, which made use of comparisons between figures shown on the company balance sheets and income statements without adjustment for differences in accounting policies, is thus founded upon faulty data and has misleading consequences.

For instance, the \$7,849m net fixed assets in Texaco's balance sheet is not the qualitative equivalent of the \$5,418m net fixed assets in Gulf's balance sheet. Texaco's fixed assets include all exploration and development costs except US lease rentals and all (or possibly only US) dry hole costs: Gulf's fixed assets include exploration and development costs less all survey costs, all delay rentals, all dry hole costs, and any other items not directly attributable to productive operations.

Most's ratio analysis is, therefore, not sound in principle. However, it remains to be determined whether the different accounting methods cause material differences in the ratios. Most's contention is that they do not, but the only evidence he offers for this view is that in the case of Exxon and Gulf a more substantial difference arises from another, apparently non-accounting, cause.

⁸Price Waterhouse & Company, *A Survey of Financial Reporting and Accounting Developments in the Petroleum Industry*, New York: PW & Co., 1972, p. 33.

The writer's study can only offer evidence of the policies followed by two of the companies in Most's sample, Gulf and Texaco, and Tables 1-3 show that their capitalisation and amortisation policies, though different, are not so different as they might be. If the Table 1 interpretation of Texaco's capital/expense policy is correct the difference is restricted to treatment of survey costs, delay rentals, and non-US lease rentals for unsuccessful properties. The ratio changes caused by these differences in accounting methods *may*, perhaps, be non-significant. On the other hand, the difficulty of making quantitative estimates of differences in accounting policies introduces an overwhelming level of uncertainty such that the effect can no longer be proved either significant or non-significant.

More positive statements can be made for comparisons between certain other companies in the writer's sample.

Take, for example, Tenneco and the Royal Dutch/Shell group. Tenneco is an extreme full cost company, and RD/Shell an extreme successful effort company. The effect of their different accounting methods is most apparent if capitalised expenditures are compared with a measure of the level of operations of each company, net fixed assets against sales, for instance. If this ratio is calculated for Texaco and Gulf, and for Tenneco and RD/Shell, the following

ACCOUNTING AND BUSINESS RESEARCH

results are obtained: Tenneco 97.8%, Texaco 91.3%, Gulf 71.1%, RD/Shell 59.2%. This is exactly what one would expect. The ratio varies from low to high according to the position of the company on the successful effort - full cost continuum. But the problem, as always, is that in the absence of information for re-casting the accounts of one company according to the accounting policies of another, it is impossible to determine to what extent the difference in ratios is due to accounting practices and to what extent it is due to 'real differences' in such parameters as solvency, profitability, and the stability of earnings.

Conclusions

The comparative analysis of oil company accounts is rendered exceptionally difficult by the use of different accounting treatments for exploration and development costs. Different initial cost classifications resulting from the capital/expense and amortisation decisions are a problem in themselves, but this is compounded by the lack of full disclosure of accounting policies and by ambiguous disclosure. The reader has difficulty in making qualitative adjustments for the differing accounting policies, and he finds quantitative adjustments to be impossible. As a consequence inter-firm comparisons of the published accounts of major oil companies are significantly unreliable.

Profit Forecast Disclosure: The Effect on Managerial Behaviour

Kenneth R. Ferris

This article describes the methodology and results of a questionnaire survey undertaken to determine the effect of profit forecast disclosure on managerial behaviour. The purpose of the study was to describe the types of behavioural responses that are emitted by managers as a consequence of the presentation of profit forecasts in prospectuses for the issue of capital. A sample of 31 firms publishing prospectuses during the period December 1972 through December 1973 was obtained from *The Financial Times* newspaper. The survey attempted to provide answers to such questions as 'Are accounting methods and accounts manipulated to achieve equality between forecasted and reported accounting numbers?' and 'Does management alter its internal operating decisions, policies, or strategies in an effort to fulfil the prophesied or forecasted result?'

A Model of Anticipated Behavioural Responses

Managerial behaviour in the prospectus forecast disclosure situation may be segmented into two time frames: (1) behaviour during the forecast specification process, i.e. managerial forecast behaviour (see Figure 1, box 1); and (2) behaviour subsequent to forecast disclosure in the published prospectus (box 6).

Managerial forecast behaviour may be described in three ways: optimistic, realistic, and pessimistic. The direction that this behaviour ultimately takes determines whether the prospectus forecast will be overestimated, realistically estimated, or underestimated. Research¹ utilising *ex post* data has previously been undertaken and the findings con-

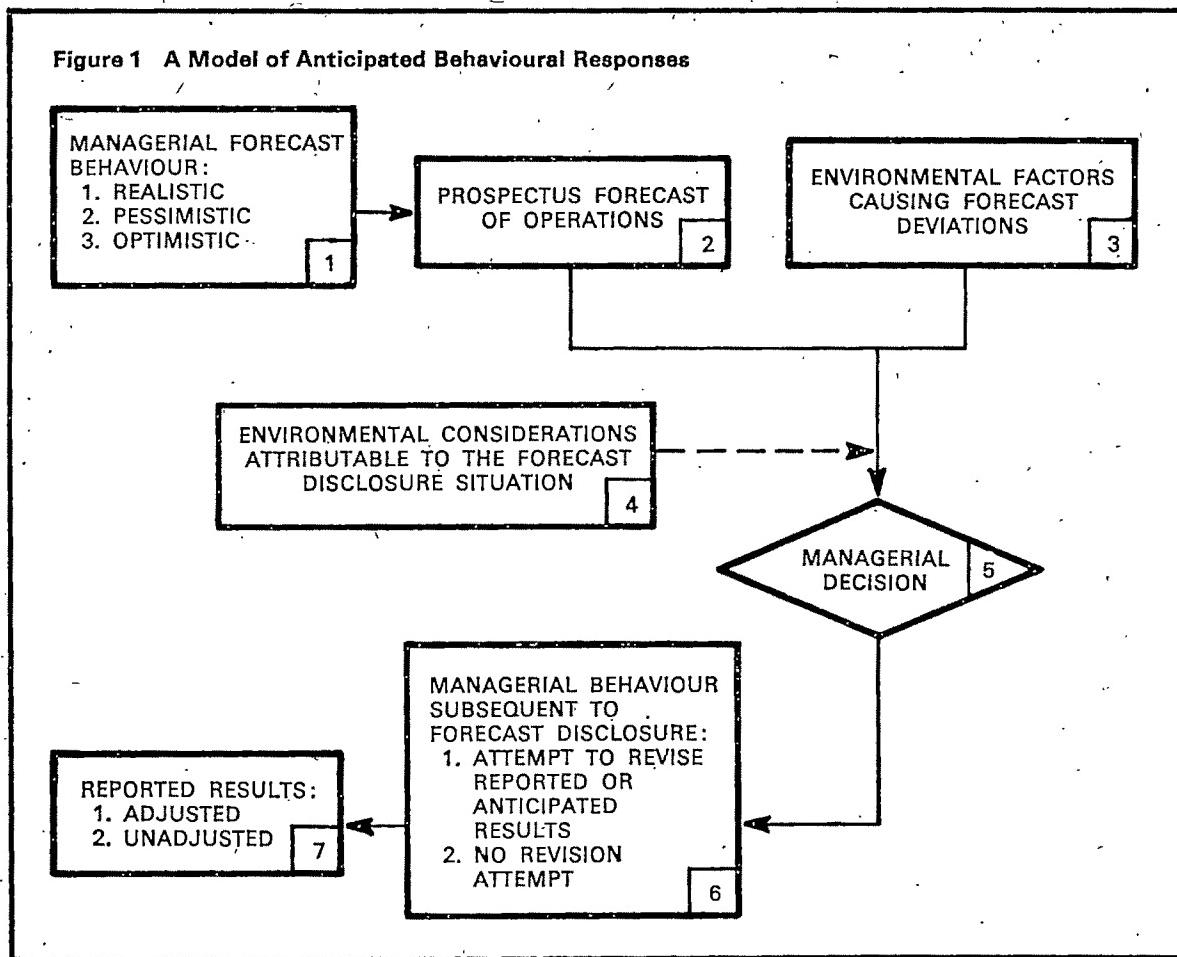
sistently indicate that managerial forecast behaviour tends to be pessimistic or conservative and, in the majority of firms, tends to be manifested in an underestimated forecast.

After the prospectus has been issued and the profit forecast disclosed to the business community, company operating results may be obtained and compared with the forecast. Forecast deviations² may be observed for numerous reasons, including the intentional overestimation or underestimation of the forecast, the failure of environmental assumptions to hold (box 3), and inadequate forecasting of operations. Regardless of the source of forecast deviation, environmental considerations attributable to the forecast disclosure situation may be present and consequently influence subsequent managerial behaviour. These environmental considerations, as well as the forecast of operations (box 2) and any environmental factors causing forecast deviations (box 3), become inputs to a managerial decision. If management views the environmental considerations as real and important, management may undertake to revise the actual or anticipated results; if such considerations are not present, or if present considered unimportant by management, no revision attempt should be anticipated (box 6).

It is hypothesised, therefore, that management may decide to engage in behaviour that attempts to legitimise the previously forecasted information; that is, management may attempt to manipulate accounts and accounting methods, engage in or avoid business transactions, or alter operating policies or strategies in an effort to validate the forecast. An operational interpretation of this hypothesis is that management will attempt to minimise the absolute numerical deviation of reported profits from the forecasted level of profits. Under such an inter-

¹S. Dev and M. Webb, 'The Accuracy of Company Profit Forecasts', *Journal of Business Finance*, v. 4, no. 3, 1972, pp. 26-39; K. R. Ferris, 'The Apparent Effects of Earnings Forecast Disclosure on Managerial Behaviour: An Empirical Examination', September 1974, Working Paper, The Ohio State University.

²'Forecast Deviation' refers to any divergence between forecasted and actual results, i.e. where forecasted exceeds actual results, or vice versa.



pretation, not only will management undertake certain accounting expediencies or follow certain discretionary actions with the intention of increasing the level of reported profit when actual appears to be below the forecast, but similar actions by management can be anticipated when actual profits appear to be in excess of the forecasted profits.

The environmental considerations that would be likely to influence management to attempt to equate forecasted and reported results are several. There may exist the desire to avoid confrontation with or criticism from current and previous investors, financial analysts, and other special interest groups; there may exist the belief that management will be evaluated according to how closely the forecast is achieved, suggesting that reliability in forecasting may be equated with a characterisation of 'good management'; and, there may exist the desire to maintain a stable share price market, relative to general economic conditions. Depending upon whether or not these environmental considerations are present and/or influential, management may or may not attempt to revise the reported (box 7) or anticipated operating results.

This article describes an investigation undertaken to determine whether managers in companies issuing profit forecasts in prospectuses altered their behaviour for the purpose of reducing forecast deviations.

Methodology

Previous research efforts have examined *ex post* data in an effort to describe managerial behaviour in the forecast disclosure situation. Such data, however, is potentially subjected to many external influences in addition to the original managerial behavioural intent. Therefore, analyses based upon *ex post* data may not reveal the true behavioural response to forecast disclosure. In an effort to avoid the stringent data assumptions imposed by the use of *ex post* data, a questionnaire survey of managers from profit forecasting firms was undertaken.

Sample

A list of firms issuing prospectuses for the period December 1972, through December 1973, was obtained from *The Financial Times*. Only those firms providing a specific forecast of profits were included. An initial letter of inquiry was sent to a

sample of 112 managing and financial directors, representing some 70 firms, to ascertain whether or not they would be willing to participate in a questionnaire study concerning the effects of financial forecasting on managerial behaviour. Sixty-eight responses were received, of which 40 were affirmative, yielding a positive response rate of 35.7%.

Subsequently, the questionnaire with covering letter and self-addressed, stamped envelope, was mailed to the 40 participants. Two follow-up letters, accompanied by additional copies of the questionnaire, were necessary to obtain the desired number of completed questionnaires. Previous research³ utilising similar types of questionnaire items ascertained that 30 questionnaires was the minimum acceptable sample size. Of the initial 40 respondents, 33 completed questionnaires were received, of which 31 were utilised in the study. Seven respondents either did not return their questionnaire or returned it unanswered; two respondents, who returned completed questionnaires, were eliminated from the survey because their responses were duplicated by another respondent from the same firm. In several firms, questionnaires had been sent to both the managing director and the financial director to ensure that at least one completed questionnaire was obtained from each firm.

Consequently, the survey sample was composed of 31 respondents representing 31 different firms. A listing of the firms is not provided, consistent with the agreement that the respondents would provide the necessary information on the condition that neither their name nor that of their company be disclosed. The respondents were composed of fifteen financial directors, seven managing directors, seven chairmen and managing directors, one chief accountant, and one chief executive. The respondents indicated that in all but one case, the individual completing the questionnaire had been extensively involved in the forecasting process.

Questionnaire

The questionnaire was developed towards two basic objectives: (1) to ascertain whether management did or did not intentionally overestimate or underestimate the profit forecast, and (2) to determine whether management intentionally utilised internal behavioural responses in an effort to reduce forecast deviations to an acceptable level.

The questionnaire was composed of three sections. The first section was directed at gathering back-

ground information on the responding company and its forecasting process through a series of questions also designed to stimulate the respondent's interest in his task. The second section was directed at (1) providing an answer to the question 'Was the profit forecast intentionally overestimated or underestimated? And, if so, why and by how much?'; and (2) gathering information concerning the extent to which the forecasting process was perceived to be influenced by uncontrollable external influences. The final section was directed at determining whether accounts, accounting methods, operating decisions or policies were altered by management for the purpose of reducing forecast deviations.

The questionnaire items were developed from the results of other questionnaire research studies⁴ and from the conclusions deduced by others.⁵ In many items, the questions were adopted directly from statements made by managers in a forecast disclosure situation. Consequently, it was concluded that the questionnaire possessed a high degree of 'face validity', the quality which makes a test appear sensible for the purpose it is to serve. Typically, validity, or the fidelity with which a test measures what it purports to measure, is measured by comparing the results obtained from one instrument with the results obtained from some standard instrument of known validity; however, this approach

⁴R. J. Asebrook and D. R. Carmichael, 'Reporting on Forecasts: A Survey of Attitudes', *Journal of Accountancy*, August 1973, pp. 38-48; M. Backer, 'Reporting Profit Expectations', *Management Accounting*, February 1972, pp. 33-37; J. J. Benjamin and R. H. Strawser, 'The Disclosure of Forecast Information', *The Ohio CPA*, Summer 1973, pp. 79-87; Booz, Allen, and Hamilton, Inc., *The Businessman's View of the Purposes of Financial Reporting*, 1973, Financial Executives Research Foundation, New York; D. T. DeCoster and J. P. Fertakis, 'Budget-Induced Pressure and Its Relationship to Supervisory Behaviour', *Journal of Accounting Research*, Autumn 1968, pp. 237-246; Financial Analysts Federation, *Disclosure of Corporate Forecasts to the Investor*, Financial Analysts Federation, 1973, New York; Financial Executives Institute, 'How Accurate are Forecasts', *Financial Executive*, March 1973, pp. 26-32; A. T. Kearney, Inc. and Sidney & Austin, *Public Disclosure of Business Forecasts*, Financial Executives Research Foundation, 1972, New York; K. F. Skousen, R. A. Sharpe, and R. K. Tolman, 'Corporate Disclosure of Budgetary Data', *Journal of Accountancy*, May 1972, pp. 50-57; S. S. Stewarts, 'Research Report on Corporate Forecasts', *Financial Analysts Journal*, January-February 1973, pp. 77-85.

⁵R. G. Brown, 'Ethical and Other Problems in Publishing Financial Forecasts', *Corporate Financial Reporting: Ethical and Other Problems*, ed. J. C. Burton, 1972, AICPA, New York; J. P. Cummings, Statement before the SEC on the 'Matter of Estimates, Forecasts or Projections of Economic Performance and Related Subjects', Peat, Marwick, Mitchell and Company, November 1972; D. C. Damant, 'A Note on Practice in the United Kingdom: Financial Forecasting by Companies', *Financial Analysts Journal*, September-October 1972, pp. 44-59.

³J. P. Fertakis, 'Budget-Induced Pressure and Its Relationship to Supervisory Behaviour in Selected Organisations', unpublished doctoral dissertation, 1967, University of Washington.

was inappropriate for this investigation because an instrument of known validity did not exist. The conclusion concerning face validity was supported by the questionnaire responses themselves, which appeared to be valid.

The reliability of the questionnaire was also examined. Reliability is the degree of consistency in repeated measurements; a test result is said to be reliable if the result is stable, or free of chance error.⁶ The results of the questionnaire could not be readily quantified; therefore, the more common statistical approaches to measuring reliability could not be utilised. Consequently, reliability was examined from the standpoint of consistency of responses.⁷ If the responses to a particular set of questions are found to be consistent with the responses to a similar set of questions, or with known fact, the questionnaire results are said to be reliable. A comparison of the responses on certain key questions indicated a divergence of responses in less than 5% of the respondents.

Results

Managerial Forecast Behaviour

In over 90% of the prospectuses examined in previous studies, profit forecasts were found to be underestimated. The data utilised in those studies, however, was *ex post* data and is insufficient to base a conclusion concerning whether or not the forecasts were *intentionally* underestimated. Consequently, a series of questions in the current investigation examined the behavioural intentions of the 31 respondents.

First, the respondents were requested to comment upon the degree of optimism or pessimism of the forecast at the time that it was published. The majority (16) of the respondents considered their firm's forecast to have been realistic; however, one respondent indicated that his firm's forecast had been optimistic and 14 respondents indicated that their firm's forecast had been pessimistic.

The respondents were then requested to indicate whether or not the forecast had been intentionally overestimated or underestimated. Fourteen affirmative responses were obtained, with 13 indicating that the forecast had been intentionally underestimated; therefore, of the sample studied, approximately 45% responded that the prospectus forecast had been manipulated prior to publication. While only 13 respondents indicated that their firm's forecast

ACCOUNTING AND BUSINESS RESEARCH

had been underestimated, an examination of the annual statement of accounts revealed that all but one of the 31 sample firms was found to have an underestimated forecast. The degree of underestimation for the 13 firms was indicated to range from 4 to 20%, with an average underestimation of over 9%.

A portion of the divergence between the questionnaire findings and the findings of the earlier studies dealing with *ex post* data can be explained by the fact that the previous question was misinterpreted or misunderstood by at least seven of the respondents. A subsequent question requested the respondent to indicate whether or not his company had utilised a 'contingency discount' in the determination of the prospectus forecast. Seventeen respondents indicated that their firm had utilised such a discount. The range of the reported discount was 2.5 to 20% of the initial forecast, with a mean discount of 8.2%. Presumably, seven of the 17 respondents did not view the use of a contingency discount as equivalent to intentionally underestimating the profit forecast; a comparison of the respondents on the two questions indicated that seven of the respondents to the contingency discount question did not indicate intentional manipulation of the forecast in the previous question. Nevertheless, the conclusion that should be drawn is that 21 of the 31 firms studied, or approximately 68%, did manipulate in some manner the forecast that was ultimately published in the prospectus.

When asked why they had underestimated the forecast, several respondents indicated:

- (1) . . . to ensure that the forecast would be bettered, because British investors traditionally expect results slightly in excess of the forecast.
- (2) . . . loss of investment status if the forecast is not achieved.
- (3) . . . to provide for hyperinflation which is causing unforeseen escalation of costs.
- (4) . . . conservative professional advisors.
- (5) . . . investors would expect us to exceed our forecast and if we failed to do so our share price would be adversely affected.
- (6) Failure to achieve comfortably the prospectus forecast is considered to reflect badly upon the company and its management by the investor and the financial world generally.

The above six responses are indicative of the total set of responses and suggest that the underestimation of the prospectus forecast is primarily a function of two factors: (1) a learned attitude of conservatism, and (2) a concern for the reaction of the business community to forecast failure, typically conveyed as a 'loss of investment status', the 'share price . . .

⁶H. E. Garrett, *Statistics in Psychology and Education*, 6th edition, David McKay Co. Inc., New York, 1967.

⁷A. N. Oppenheim, *Questionnaire Design and Attitude Measurement*, Basic Books Inc., New York, 1966.

adversely affected', and a general reduction in confidence and credibility in the firm.

Approximately 97% of the sample studied was found to have an underestimated forecast; however, only 68% of the respondents admitted to some form of forecast manipulation prior to publication. One explanation for the divergence of these results is the presence of unexpected events, e.g. the failure of the assumptions underlying the forecast to hold. The respondents suggested that, on the average, 22% of the total deviation between the forecasted and actual results could be attributed to significant events occurring during the forecast period, which affected profits and were not accounted for in the forecast. The presence of these events, however, is insufficient to explain the total deviation between the observed percentage of underestimated forecasts and the reported percentage of intentionally underestimated forecasts. Two alternative explanations exist: (1) some of the respondents were not willing to admit to the intentional manipulation of the forecast, or (2) the forecasting skills and techniques of management were inadequate.

Accounting Adjustments

It has been hypothesised that if deviations between the forecasted and actual results are present, and if certain environmental considerations are present and viewed as important, management may attempt to reduce these forecast deviations through the use of accounting adjustments. In the Ferris study of 283 profit forecasts from the period 1970 through 1973, an analysis of the annual statement of accounts revealed only 55 firms experiencing accounting adjustments. Of these 55 firms, only seven appeared to be utilising the accounting adjustments for the purpose of reducing forecast deviations. In an effort to confirm or reject these findings, the questionnaire respondents were requested to complete a series of questions dealing with the use of accounting adjustments.

To establish whether or not managers would be sufficiently motivated to utilise accounting adjustments to reduce forecast deviations, the respondents were requested to indicate how important they felt it was to achieve the forecast. The entire sample responded that achieving the forecast was important; further, 84% of the sample indicated that it was 'extremely important'. This finding appeared representative of a comment by one of the respondents: 'Public forecasts *must* be achieved'. The strength of the responses suggested that the managers were sufficiently motivated to utilise accounting adjustments, if necessary, to achieve the forecast.

The respondents were then asked: Has your

company ever utilised alternative accounting methods for the express purpose of reducing the expected deviation between actual and forecasted results? Seven of the responding firms, or 22.6%, replied affirmatively. Several negatively replying respondents suggested that accounting adjustments would never be utilised by their firm because the adjustments would have to be detailed in the annual statement of accounts in accordance with the Companies Act of 1973. One implication of this opinion is that some managers view the use of accounting adjustments as 'too obvious' an approach to forecast deviation reduction; this view would readily explain the low incidence of observed accounting adjustments in the Ferris study.

Another type of accounting adjustment is the failure to undertake planned or desirable accounting changes because of their effect upon forecast deviations. The respondents were asked: Has your company ever failed to undertake a change in accounting method because of the adverse effect of such a change on the expected deviation between actual and forecasted results? Only five firms indicated that accounting changes had ever been avoided because of their effect upon forecast deviations. Combining these results with the responses to the previous question yielded twelve instances of accounting adjustments; however, only ten different firms are represented because two respondents indicated that their firm had both undertaken and avoided accounting adjustments on the basis of their effect upon forecast deviations.

A final variant of the use of accounting adjustments was then considered: Has your company ever attempted to adjust any accounting record for the express purpose of reducing the expected deviation between actual and forecasted results? The findings again indicated that a small percentage of firms had resorted to this type of accounting adjustment. Of the five affirmatively responding firms, two had previously indicated utilisation or avoidance of accounting adjustments. Consequently, the total incidence of firms utilising accounting adjustments (defined as the use of alternative accounting methods, the avoidance of the use of alternative accounting methods, and the adjustment of accounting records), was thirteen firms, or approximately 42% of the sample studied.

A final consideration was the effect of the reported adjustment on actual results. Three firms indicated that profits had been adjusted upward, and in ten firms, profits had been adjusted downward.

Discretionary Actions

While management may utilise accounting procedures as a means to insure that forecasts are

achieved, a less obvious and perhaps more efficient approach is the use of discretionary actions. Discretionary actions refer to internal operating decisions, policies, and strategies that may be planned or altered to reduce forecast deviations. The respondents were asked: Did your concern for achieving the forecast ever consciously influence the operating decisions that you made during the period covered by the forecast? The results indicated that in the sample studied, 26 of the 31 firms did in fact consciously allow their operating decisions to be influenced by the forecast disclosure situation. Some respondents provided examples of the types of decisions that were influenced:

- (1) The decision was made not sell a building that we had planned to sell.
- (2) Large repairs to a factory roof were deferred.
- (3) Revenue was recognised in one accounting period rather than another.
- (4) We declined to take on risky business that we would have normally accepted.
- (5) A decision on the acquisition of loss making companies which would have been included in consolidated results was deferred.
- (6) Quite frankly, virtually *all* decisions are based on achieving or exceeding the forecast.

The findings indicated that in approximately 84% of the firms studied, the management had allowed their operating decisions to be influenced by the forecast disclosure situation. The mode by which this influence was exercised was then investigated.

The respondents were asked: Has your company ever consciously attempted to alter any decision or activity for the purpose of reducing the expected deviation of actual results from the forecasted results? Twenty-two respondents indicated that there had been a conscious attempt to alter operating decisions and activities in order to reduce forecast deviations. The following question stated: Has the management ever pursued any operating policies expressly directed at minimising the expected deviation between actual and forecasted results? Sixteen firms responded that they had followed such policies; therefore, approximately 52% of the firms studied actively planned and pursued operating strategies designed to manipulate the reported results. A final variant of the use of discretionary actions was considered: Has there ever been any attempt to suppress profits or avoid expenditures in an effort to reduce expected deviations between forecasted and actual results? Sixteen of the 31 respondents indicated that at some time during the forecast period, profits had been suppressed or expenditures avoided for the purpose of reducing forecast deviations.

Aggregating the results of the previous four questions suggests several observations. Of the 31 firms in the questionnaire sample, 26 responded that their operating decisions had been consciously influenced by their concern for achieving the forecast. Of the 26 firms, 22 indicated that they had consciously engaged in some type of discretionary action: (1) 22 firms manipulated their operating decisions and activities for the purpose of reducing forecast deviations; (2) 16 pursued operating policies expressly directed at minimising expected forecast deviations; and (3) 16 attempted to suppress profits or avoid certain expenditures in order to reduce anticipated forecast deviations. Therefore, over 71% of the sample studied utilised some type of discretionary action to reduce forecast deviations. These findings, together with those relating to accounting adjustments, suggest that where forecast deviations occur, managers prefer to utilise discretionary actions rather than accounting adjustments to reduce those deviations.

Response Bias

One consideration in evaluating the significance of these results is whether or not 'response bias' was present. Response bias occurs when those who complete a questionnaire differ from those who do not, and consequently 'the returns are not representative of the original sample drawn'. One method of determining whether response bias had been introduced into a study is to compare the respondents with the non-respondents on some known attribute.

A sample of 26 firms issuing prospectuses with a profit forecast during 1973 was utilised as a basis of comparison for the 31 respondents. The two samples were compared on three attributes: (1) the average length of the forecast period, (2) the average forecast error, and (3) the percentage incidence of overestimation and underestimation of forecasts. Other attributes could have been utilised; however, these attributes appeared to be the most relevant in light of the purpose of the study. The results of the comparison were: (1) the difference in the average length of the forecast period between the two groups was negligible; (2) the questionnaire respondents were found to have a slightly larger average forecast error, suggesting that they tended to underestimate their forecasts by a slightly greater percentage than did the non-respondents; and (3) the non-respondent group was found to have 4% more overestimated forecasts (and 4% fewer underestimated forecasts). The finding suggested that while some difference between the two groups was observable, the difference was so negligible as to warrant concluding that the groups were not significantly different and that

response bias was not present.

Study Limitations

The results of this investigation cannot be generalised beyond the circumstances associated with the issuance of a prospectus. Management cannot be expected to behave the same under a merger or takeover attempt as they might in a situation of the issuance of new capital. Further, 'the companies that issue prospectus forecasts are not a representative sample of all companies, as both very large companies and those whose recent records are mediocre or worse tend to be under-represented.'⁸

Conclusions

A sample of 31 firms was utilised for a questionnaire survey concerning the effect of profit forecast disclosure in prospectuses upon managerial behaviour. The firms had issued prospectuses containing a specifically defined profit forecast during the period December 1972 through December 1973.

The main findings of the study were:

(i) Sixty-eight per cent of the sample studied

indicated that their forecast had been manipulated in some manner prior to publication in the prospectus.

(2) Forty-two per cent of the sample studied indicated that their firm had utilised some type of accounting adjustment to reduce forecast deviations; 'accounting adjustment' was defined as the use of alternative accounting methods, the avoidance of alternative accounting methods, and the adjustment of accounting records.

(3) Seventy-one per cent of the sample studied indicated that their firm had utilised some type of discretionary action to reduce forecast deviations: (a) 22 firms manipulated their operating decisions and activities; (b) 16 firms pursued operating policies expressly directed at minimising expected forecast deviations; and (c) 16 firms attempted to suppress profits or avoid expenditures in order to reduce deviations.

If a generalisation of managerial behaviour can be drawn from the results of this study it is this: managers tend to underestimate the prospectus forecast; where material forecast deviations occur, managers tend to resort to the use of discretionary actions, and occasionally to accounting adjustments, to reduce those deviations.

⁸Dev and Webb, p. 29.

Empirical Research into Information Utility and Acceptability

T. A. Lee

Introduction

Without doubt, the most pressing and crucial problem facing the accountancy profession today is the search for a blend of reportable financial information which is likely to satisfy the requirements of its potential users. The various efforts of the major accountancy bodies throughout the Western World amply evidence this point at the present time; with a real danger existing that if accountants do not put their house in order then someone else most surely will (for example, national government). It is therefore encouraging to find recent research studies such as those of Carsberg, Hope and Scapens¹ and Fisher² which are attempting to find out facts and opinions necessary to delineate the various related problems, and produce radical and meaningful solutions.

In the case of the Carsberg study, the goal was to seek opinions on the objectives of company financial statements. This was mainly done by interview and a questionnaire sent to qualified accountants, and the overall result was summed up in a concluding statement³:

'The traditional stewardship objective of accounting is still widely acknowledged as important. There appears to be a growing consensus, however, that the provision of information to assist shareholders with their investment decisions should be recognised as a second important objective of accounting statements.'

One can argue with the acceptability of this conclusion given the extremely small number of respondents concerned – that is, the questionnaire had

121 usable responses, and there were 26 interviews. Given that there are well over 50,000 chartered accountants working in the UK at the present time (apart from certified and management accountants), the obvious question is raised as to whether this very small sample of opinion is sufficient to give a clear indication of the UK profession's views on financial statement objectives.⁴ Nevertheless, it is a first pointer to professional opinion in this general area, and one would hope that the problem will not be left to lie there and that more research of a much wider and more detailed nature is going to be conducted. Indeed, the authors state their intention to do this.

Interestingly, the Fisher study is an attempt to look at financial statement practices in depth and, in particular, it sought opinions on the types of information which users of company financial statements find acceptable. The emphasis, therefore, was on the consumer of accounting information rather than its producer (which was the case with the Carsberg study). This user-orientated approach appears to be potentially fruitful given that it is financial statement users who have to be satisfied and who, in the first instance, determine the degree of influence which company financial statements have on their behaviour. However, having pointed his research effort in an apparently relevant direction, Fisher has produced a research format which casts doubts on the validity of his data and the meaningfulness of his results and conclusions. The following paragraphs attempt to support this criticism; hopefully, in a constructive manner.

Sample Response

One of the most crucial matters in empirical research,

¹B. Carsberg, A. Hope, and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, Summer 1974, pp. 162-173.

²J. Fisher, 'Financial Information and the Accounting Standards Steering Committee', *Accounting and Business Research*, Autumn 1974, pp. 275-285.

³Carsberg et al., od. tci, p. 1.73

⁴The authors in the Carsberg study do, however, state (p. 171) that it would be dangerous to draw general conclusions.

particularly if it is seeking facts or opinions, is to ensure that the sample response is sufficient to produce analysable data. The Fisher study has included the opinions of bankers, financial executives, financial analysts, insurance company executives, stock exchange dealers and brokers, and accountants, as well as academics and educationalists. The locations of these potential respondents were North America, Europe and the United Kingdom. This is an enormous coverage and the total population from which the sample was drawn must be in the many tens of thousands. Yet only 600 questionnaires were sent out, and 245 were returned. Of these 114 were North American; 78 came from Europe; and 53 from the United Kingdom. However, for purposes of his paper, Fisher excluded the largest group, and concentrated on 131 responses from Europe and the United Kingdom.

Remembering that this was a survey of opinions rather than a seeking of facts, one is left wondering whether any useful conclusions can be drawn from such a small number of responses taken from such an enormous population. Although it is not possible to survey the entire population, it is possible to obtain a larger sample which could give a clearer and more representative portrayal of opinions amongst the groups concerned. If the sample is too small then, no matter how meaningful the questions asked and no matter how rigorous the subsequent analysis, the answers cannot be relied upon as giving anything other than the views of a very small group of people. Yet Fisher attempts to conduct such an analysis, producing means, standard deviations, coefficients of variance, as well as conducting unspecified chi-square tests.

The smallness of the sample may have been more acceptable if Fisher had concentrated on one particular financial statement user group in one or two countries, instead of spreading himself so widely. In addition, he makes no statement of how his sample was chosen and, particularly, how random the selection was. An answer to this point is also crucial to the validity of the end results.

Questionnaire Questions

Questionnaire design is vital to a project such as the Fisher study. In particular, questions must be presented without bias and ambiguity in order that the respondent gives a clear-cut answer without being misled or confused. Unfortunately, the sample questions in the Fisher study contain ambiguities which must have caused the respondents difficulties when formulating answers. For example:

(i) *Question 13(a)* 'Would you favour financial

statements which reported different valuation bases?

This question implies two separate situations. Firstly, it could mean the reporting of one set of data containing several different values (for example, historic costs, replacement costs, and net realisable values). This is already the case with traditional historic cost financial statements which, although based largely on historic costs, can contain items of stock and work in progress at replacement cost or net realisable value, investments and debtors at realisable values, as well as the revalued land and buildings. Alternatively, it could mean the situation envisaged by, for example, Gynther⁵ and Stamp⁶ in which financial reports contained several sets of statements describing the same situation — for example, one set of statements on a historic cost basis, one set on a replacement cost basis, and yet another on a net realisable value basis. In other words, is the question dealing with one set of statements involving a heterogeneous mixture of values; or several sets of statements each using a different but consistent value base? These are two separate issues possibly involving different responses. Yet Fisher appears to have lumped them together and, consequently, the responses must be treated with some scepticism.

(ii) *Question 13* 'Should corporations report projections of future expectations on a periodic basis?'

In this case, the question lacks precision and adequate definition, and is extremely difficult to answer without numerous qualifications. Yet respondents were asked to give a straight 'yes/no' answer. No indication is given of what is meant by future projections — for example, are they to be quantitative or non-quantitative or a mixture of both; do they refer to profitability or financial position or cash flow or what; and what time period do they cover — is it six months, a year, two years, or ten years? Many people might favour the reporting of forecast data (as the survey figures indicate) but this gives very little insight into their detailed views on the matter, and no indication of the types of forecast being envisaged by the respondents or by the researcher. In other words, this is an example of a question being too general to give any useful response.

(iii) *Question 13(b)* 'Please state the acceptability of each of the bases below: current replacement cost, net realisable value, net present value, reproduction

⁵R. S. Gynther, 'Accounting for Changing Prices', *The Chartered Accountant in Australia*, December 1971, pp. 12-23.

⁶E. Stamp, 'R. J. Chambers: Quo Vadis et Cui Bono?', *The Chartered Accountant in Australia*, August 1972, pp. 10-12.

cost, opportunity cost, and historic cost updated by a general price index.'

When the word 'acceptability' is used in a question such as this, it raises two supplementary questions – acceptability for whom and for what purpose? Fisher provides no answer to this, despite the present debate on alternative income and value measurement systems for reporting purposes, and despite the diversity of interests and cultures represented in his sample. He does not distinguish between the differing needs and interests of various users of financial statements. In addition, there is no indication of whether acceptability is being thought of in terms of one set of financial statements using several valuation bases or several sets of financial statements, each using a different basis (a similar point to that raised in (i) above).

It is a relatively obvious point to students of income and value measurement that different valuation bases produce different income and capital data, despite a common company situation.⁷ And each appears to produce information with a particular use in a particular situation to a particular user. For example, the replacement cost basis appears to produce useful income measures, particularly for internal management purposes, but does not produce such a useful balance sheet. On the other hand, realisable values appear to produce meaningful balance sheets for shareholders concerned with whether their company should continue in its existing form. The equivalent income measure, on the other hand, does not appear to provide the same degree of usefulness to investors and others. Indeed, Macdonald⁸ has recently suggested that different valuation bases could be used for income reporting and balance sheet reporting, and that financial statements need not be inter-related. Fisher has ignored these points and provided responses which, by themselves, are not particularly meaningful or interpretable. Indeed, he comes to the following conclusion⁹:

'... question 13(b) ... also suggests that external users in both locations place great emphasis on the need for information expressed where possible in current replacement cost terms.'

Finally, it is not at all certain that the bases on which respondents are being asked to give an opinion are valuation bases or capital maintenance concepts.

ACCOUNTING AND BUSINESS RESEARCH

Presumably they are intended to be the former, but Fisher introduces the category of 'historic cost updated by a general price index' which is a combination of a valuation basis (historic cost) with a capital maintenance concept (maintaining money capital in current purchasing power terms). This appears to be confusing two separate issues¹⁰ and, if the acceptability of alternative values was the issue then historic cost should have been one of the alternatives. On the other hand, if the capital maintenance problem was also being surveyed, then a further list of alternative items should have been included – that is, the existing list; together with another list of the same items, each updated by a general price index. This was not done and one is left wondering what was the real subject-matter of the question. In any case, the existing list is incomplete as it does not contain the unadjusted historic cost category.

Questionnaire Scales

It is usual when designing point scales in questionnaires to specifically define each point so that the respondent is fully aware of the available answer categories. This Fisher has done and he explains his thinking in the text.¹¹ However, his scales leave a lot to be desired, particularly as they involve diametrically opposite points – that is, 'no importance to very great importance', 'strongly disagree to strongly agree', 'not useful to extremely useful', and 'not acceptable to very acceptable'. In these situations, normal practice dictates a mid-point in the scale which denotes a 'neutral' or 'undecided' position – that is, one which the respondent can use to indicate he does not have any views on the matter or is indifferent in his views. In all but one of his scales (that is, the 'disagree/agree' one) Fisher ignores the neutrality of the mid-point and places, in each case, a positive response instead. The result is that his mid-points are not really mid-points if the scales are to be descriptive of the full range of positive and negative responses required by the researcher; and the respondents have not been given the opportunity to indicate a 'neutral' or undecided response in each case. In his 'importance' scale of five points, a neutral point should have been inserted, and either point 2 (little importance) or point 3 (some importance) dropped. Only Fisher can explain the subtle difference between these points. In the 'usefulness' and 'acceptability' scales, the insertion of a mid-point would have required the insertion of another point to bring the total up to five, or the deletion of a

⁷For a detailed study of this problem, see T. A. Lee, *Income and Value Measurement*, Nelson, 1974, or G. Macdonald, *Profit Measurement: Alternatives to Historical Cost*, Accountancy Age Books, 1974.

⁸G. Macdonald, 'Deprival Value: Its Use and Abuse', *Accounting and Business Research*, Autumn 1974, p. 269.

⁹Fisher, op. cit., p. 280.

¹⁰See Lee, op. cit., pp. 5-15 and 107-109.

¹¹Fisher, op. cit., p. 279.

point to keep the total at three. Either way, it is obvious that the imbalance of the scales must render the subsequent analysis of data somewhat incomplete. The respondents have been asked to answer within an incomplete range.

Analysis of Data

Table 1¹² contains responses to a number of questions involving 'yes/no' answers. Despite the black and white nature of these responses, Fisher proceeds to produce means, standard deviations and coefficients of variance. These are virtually meaningless given the two point scale and, indeed, because of a lack of explanation, it is extremely difficult to find out how they have been computed. This contrasts with the three and five point scales in other tables for which there are adequate explanations of the points range adopted. In fact, Fisher has allotted a point value of 1 for a 'yes' response and 2 for a 'no' response in order to calculate the mean and, thus, the standard deviation, etc. This would appear to be completely opposite both to what it should be and what Fisher has done with the other multi-point scales. The result is a biased mean. For example, in question 13(a), 31 respondents said 'yes', and 22 said 'no'. When applying Fisher's point values, this gives a mean of 1.415, a standard deviation of 0.492 and a coefficient of variance of 0.348. It therefore appears that the average response is tending towards the 'no' category with its 2 point value when, in fact, observation shows that the majority of responses were positive. By reversing the point values (yes = 2 and no = 1), the mean becomes 1.585 (that is, the average is tending towards the 'yes' category); the standard deviation is 0.492; but the coefficient of variance becomes 0.310 (somewhat lower than the original of 0.348). Similarly, with question 15(a), the mean becomes 1.906, the standard deviation 0.292, and the coefficient of variance 0.154, as compared with Fisher's original figures of 1.094, 0.292 and 0.267, respectively. This can be done to all the 'two response' questions posed by Fisher in his paper and suggests that his means and coefficients of variance are misleading and inaccurate when a 'yes/no' type of response was required.

On a minor point, it is clear that in Question 13(b) in Table 2,¹³ the coefficient of variance for opportunity cost cannot possibly be 1.434. In fact, the correct figure should be 0.841.

Interpretation of Data

Two preliminary points come to mind when looking

at Fisher's interpretation of available data. First, because he has not provided means, standard deviations and coefficients of variance for his European responses, it is impossible to adequately compare them with the United Kingdom figures, except in terms of percentage responses. Certainly, he is unable to compare the spreads of response around the means for the two groups. Secondly, even if these statistics were available, one doubts whether they would have been used in a comparative analysis - Fisher has made no attempt to use his UK statistical measures in any part of his section on 'Findings and Implications'. Perhaps the small number of responses he was analysing prevented him from conducting such an analysis - in which case, why was it necessary to produce them in the first place, and what degree of faith can one place in the numbers themselves, given the small response?

The lack of use of the calculated and published standard deviations and coefficients of variance has meant that, in one particular area, the spread of response has been ignored when it is crucial that it be commented upon. This refers to the responses to Question 13(b) in Table 2¹⁴ relating to the acceptability of various bases of valuation for financial reporting purposes. It has already been stated that the ambiguities in this question make the responses difficult to interpret and the size of the coefficients of variance support this - that is, 73.4% for current replacement cost; 75.3% for net realisable value; 81.6% for net present value; 74.3% for reproduction cost; 81.4% for opportunity cost (the amended figure); and 74.8% for price-level adjusted historic cost. These figures indicate significant spreads of responses around the mean and hardly support the suggestion by Fisher¹⁵ that:

'external users in both locations place great emphasis on the need for information expressed where possible in current replacement cost terms.'

In fact, casual observations of the absolute responses show that 38.5% of European respondents and 37.7% of UK respondents stated it was not acceptable. As the precise circumstances in which replacement cost could be acceptable were not stated in the question, it is not surprising to find such a spread of responses.

Fisher also stated¹⁶ that:

'in addition from question 17(b) in Table 4 it would appear that although both the European and United Kingdom respondents are not entirely satisfied with the retention of historic costs the

¹²Ibid., p. 282.

¹³Ibid.

¹⁴Ibid.

¹⁵Ibid., p. 280.

¹⁶Ibid.

United Kingdom respondents are much more prepared to accept this method as a means of reporting.'

When looking at the figures concerned, this interpretation must be treated with care. Only 30 European respondents and 25 United Kingdom respondents agreed to the retention of the historic cost basis. These extremely small numbers should not be taken out of context; they are virtually meaningless as indicators of European or British attitudes to historic cost based financial statements. Therefore, is it worthwhile to analyse and comment on them?

Finally, how is it that Fisher can conclude:¹⁷

'that reports giving probabilistic ranges rather than deterministic figures would be deemed to be credible?'

This statement is made on the basis of 46 of 78 European respondents, and 29 of 53 UK respondents saying 'no' to the question of whether they would regard such probabilistic reports as credible. Even allowing for the unrepresentativeness of the figures, surely the opposite conclusion could have been reached?

Summary and Conclusions

One can go on at length commenting on particular aspects of the Fisher study but the above points appear to be sufficient to draw together certain matters which should be adhered to in any empirical study:

¹⁷Ibid.

(a) Studies such as that of Fisher are entirely necessary if the accountancy profession is to delineate and solve its major financial reporting problems. They are therefore to be encouraged and, where possible, replicated until there is sufficient evidence to produce significant conclusions and suggestions.

(b) Nevertheless, empirical studies, if they are to be of any use, must be adequately structured, and the data must be convincing enough to allow its readers to accept it as valid evidence of a particular issue or problem. This has not been the case with the Fisher study, for the following reasons:

(i) The sample and the sample response were far too low, given the populations they were taken from, to allow anything but the most limited conclusions to be drawn. In addition, no indication was given in the paper about the sample selection procedures.

(ii) The questions asked of potential respondents were, in many instances, vague and ambiguous because they were asked without a context. This raises serious doubts about the validity of the response given.

(iii) The analysis and interpretation of data were inadequate due to (1) statistical analyses which were not required in some instances and which were based on a dubious points scale; (2) the lack of comparable statistical measures for the two groups of respondents concerned; (3) the lack of interpretation of statistical data in crucial question areas; and (4) more generally, the difficulty of drawing any conclusions from such small national and international responses.

The Financing of Rapid-Growth Firms up to Flotation

P. J. Hutchinson, J. A. Piper and G. H. Ray

Introduction

This article examines the results of an investigation into the financing of a sample of six rapidly growing firms up to the point of their flotation on the London Stock Exchange. This research, along with an investigation of the financial control aspects of the firms involved, was carried out at the School of Management, Bath University, with funds provided by the Esmée Fairbairn Charitable Trust.

Defining Growth and Selecting the Population

The problems experienced initially in the Bath project were definitional. It seemed reasonable to assume that rapid growth had occurred if a business started small and became large within a relatively short period of time. Since the Bolton Committee's¹ report had been published at the time the research was started, it was decided at first to use their definitions of small firms. As proof of rapid growth to a large size, a London Stock Market quotation, gained within ten years of the inception of the business, was required. This meant that any firm which was not a company at the beginning of the ten year period would have become incorporated by the end of the period. It was decided to limit the number of companies from which the population was derived to those which went public between April 1968 and March 1973. Thus the field of interest included, and yet lay beyond, that encompassed by the Bolton Committee. It consisted of firms that initially fell within the Bolton Committee definition, then grew rapidly out of that definition and finally obtained a public quotation. It did not, therefore, include firms which outgrew the Bolton Committee definition but which had not as yet obtained a quotation. The firms were, by definition,

extremely successful and experienced rapid growth over a relatively short time period.

The first analysis of companies going public during this five-year period, using the Bolton Committee's criteria, produced a very small population and one which the authors felt too restrictive, in that it excluded companies which would normally be regarded as rapidly growing. It was therefore decided to extend the definition of 'small' to include not only the Bolton Committee's definitions, but also firms which within ten years of going public had started business without prior trading with owners' capital of £20,000 or less, or firms which at the beginning of the ten year period prior to flotation had profits before tax of £20,000 per annum or less and turnover of £250,000 or less. During the five year period April 1968 to March 1973, 676 companies were newly quoted on the London Stock Exchange, of which 149 satisfied the above definitions.

Use of Case Studies and Selection of Sample

Previous surveys into company finance have produced a low response rate. For example the Oxford Study² had replies from only 335 firms out of a possible 1,077, a survey by Jervis³ had a fifty per cent response and the Bolton Committee⁴ had only 2,115 firms out of 15,800 reply to the questionnaires. Another problem with these surveys was that whilst a series of 'snap shots' is available taken at various points in time covering aspects of financing, longi-

¹J. Bates, 'The Financing of Small Business', London, Sweet and Maxwell, 1964.

²F. R. Jervis, 'Private Company Finance in the Post-War Period', Manchester School, 25, 1957, pp. 190-211.

³Committee of Inquiry on Small Firms, 1971, *Research Report No. 16*, 'A Postal Questionnaire Survey of Small Firms: An Analysis of Financial Data', M. Tamari.

⁴Committee of Inquiry on Small Firms, 1971.

tudinal studies are rare. In view of the low response rate of these previous studies, the dynamic nature of the study, the state of explanatory theories and the need to develop data collection techniques, it was decided for the Bath study to carry out a two-stage investigation, in which the first stage would consist of a study of a sample of six growth companies from the total population. The financing characteristics of these companies would be studied in depth and the relevant findings structured into case studies (which are now available on application to Bath University). These case studies with their analyses would lead to explanations of the data, which would be further tested and refined by a re-entry, in the second stage, into the total population.

The case study research approach was chosen for the first stage of the investigation as it enabled the research team to study closely the issues involved in specific companies. The process of analysis, building explanatory theories and developing hypotheses for further testing has been assisted by the use of the case studies in teaching.

The case studies consist of a descriptive statement of the financing characteristics of the company up to the point of obtaining a public quotation, together with a detailed analysis of the situation. The descriptive statement can be termed a 'teaching case'.⁵ In a sense, the six analytical case studies have been used as stepping stones in an exploratory exercise to reach a position of synthesis leading to the development of explanations and hypotheses to be tested in the second stage of the study. The research strategy therefore involves the interaction of observed data and explanatory theories in the first stage as the case studies and their analyses are prepared; and also in the second stage when the total population is surveyed. This grounded theory approach⁶ holds some advantages over 'snap shot' surveys with low response rates which typify research in this field to date.

Research Objectives

Having resolved definitional problems and having selected six firms from the population produced, the next stage in the process was to formulate hypotheses concerning the financing of the six companies in our sample. It was considered that since the companies in the sample were extremely rapidly growing,

then the financing profile they would show would be to the extreme of those in the Bolton sample of rapidly growing companies given in Research Reports 16 and 17. It was also considered necessary to go beyond the analyses in the Bolton Committee Research Reports, which were based on data for 1964 and 1968 only, and examine the financial profiles of the firms over time. It was thought that this would reveal changes in the profiles as the firms neared flotation. Finally, information of a more qualitative nature was required in order to test whether small firms have problems in finding advice about finance and subsequently in raising finance.

Data collection was done by means of a direct request to six companies within the previously defined total population (see Appendix 1). Balance sheet and profit and loss account data were obtained for a period of up to ten years prior to flotation and the qualitative data about financing were obtained by means of interviews with the various company chairmen or finance executives.

The data were then analysed in three stages. First, a financial analysis of the companies was prepared, including a balance sheet profile, and this was then compared with the figures from the Bolton Committee Research Reports 16 and 17. Secondly, the financial profiles of the companies were analysed over a period of time up to ten years before flotation to find any trends. Finally, an evaluation was made of the results of the replies given by the companies' executives to the questions asked about the problems of raising funds.

Findings

(i) Financial Profile

The financial analysis of companies in the Bath sample confirmed the view that their characteristics would be to the extreme of those of the Bolton Committee's for rapidly growing companies. The six companies were even more profitable, less liquid and distributed less profit than the Bolton companies, and at the same time, analysis of their balance sheets showed that they had less cash, a higher level of debtors and greater finance from creditors. The only significant exception to this pattern was that the companies in the Bath sample all relied much less on long-term borrowed funds. Exhibit 1 shows the relevant figures:

The figures shown in Exhibit 1 are the averages for each of the six firms over the period up to flotation. Where, in Research Report 16, figures for two years (1964 and 1968) are given, the average of the two was used as the 'Bolton' figures. From Exhibit 1 it can be seen that, compared to the Bolton averages,

⁵G. H. Ray, 'Budgetary Control Case Studies show ways to improved Management - The Use of Cases for Research and Development in Management Accounting', *Management Accounting*, February 1974.

⁶B. G. Glaser and A. Strauss, 'The Discovery of Grounded Theory', Weidenfeld and Nicolson, 1967.

	Bath Sample Firms' average over period						Bolton average (rapidly growing companies)	
	Manufacturing			Non-Manufacturing			Man.	Non- Man.
	A	B	E	F	C	D		
Balance Sheet (Percentage of total assets)								
Debtors	50	36	40	35	45	50	33	43
Cash	2.5	1	2.5	0.5	4	3.5	4.6	4.6
Long-term loans	0.5	4	0	2.5	0.5	4	6.5	4.9
Creditors	37	44	53	28	41	57	34	34
Financial ratios								
<i>Liquidity</i>								
Current assets ratio	1.0	1.1	0.9	1.45	1.2	1.15	1.45	1.5
Quick assets ratio	0.85	0.8	0.6	0.7	1.2	0.7	0.95	0.9
<i>Profitability</i> (net before tax)								
Profit as percentage of equity	83	33	-5	2	88	160	28	22
Profit as percentage of turnover	12	8	3	-0.5	4.7	6	6.1	3.7
<i>Distribution</i>								
Dividends as percentage of equity	0.5	0.5	1	1.15	0	0	5	10
Dividends as percentage of profit	2	1	3	19	0	0	18	48

all the firms in the sample had a higher proportion of debtors, lower proportion of cash and long-term loans; lower current assets ratio and lower percentage of dividends to equity. Five out of six had a higher proportion of creditors, lower quick assets ratio and lower percentage of dividends to profit after tax. With regard to profitability four out of the six had higher profit as percentage of equity and turnover.

(ii) Changes in the Financial Profile

The above profile is, however, drawn from the average of the figures over time, and as such conceals any trends. The trends were determined by taking the average of the figures for the six firms for each of the ten years prior to flotation. This was done by counting the last full accounting year before each firm went public as minus one and aggregating the figures for the six firms on that basis for each year up to year minus ten. Some companies were not in existence for the whole ten years and so a weighted average was taken.

This analysis showed that profit increased from minus 35% of equity to plus 56% over the ten years. Net profit as percentage of turnover increased from minus 6% to plus 11%. This is much in line with what would be expected for rapidly growing com-

panies, an initial period of losses followed by growth and profitability. When compared with the Bolton figures of an average between 22% (non-manufacturing) and 28% (manufacturing) for return on equity and between 3.7% and 6.1% for net profit, it can be seen that the profitability of the six started much lower and increased to be twice as high.

Perhaps not so expected was the decline over the ten years of the proportion of debtors and creditors to total assets. For debtors the figure fell from 60% of total assets to 35% and for creditors from 62% to 37%. The Bolton average for debtors was between 33% (manufacturing) and 43% (non-manufacturing); and for creditors 34% (both manufacturing and non-manufacturing). This suggests that some 'normalisation' was taking place, that is, the six firms in the sample started with debtors and creditors almost twice as high as the Bolton figures, but that as they approached flotation, these figures came down to almost the same level as the Bolton ones. For creditors this may be explained by the fact that initially there is rarely any other form of finance available apart from creditors (and the owner's own investment); but as the business grows, other forms of finance, like bank loans, become available and, of course, most important of all, profits can be re-invested in

the business. As far as debtors are concerned, the high initial proportion may be due to the need to stimulate growth in sales at the beginning, and so extend as much credit as possible as an incentive; this may be more attractive than price cutting, and also in these early stages the firm may be so small as to be unable to avoid pressure to grant credit to its customers.

Finally, with regard to liquidity no clear trend was apparent but rather a series of oscillations which were greatest at the beginning and end of the period and less in the middle period (see Exhibit 2).

From Exhibit 2 it can be seen that the current ratio is consistently below that for Bolton and that the current assets ratio for the six companies was lowest in the middle years. This may be due to the 'take off' in sales and profitability occurring during this time and imposing greater strains on liquidity.

(iii) Problems in Raising and Managing Finance

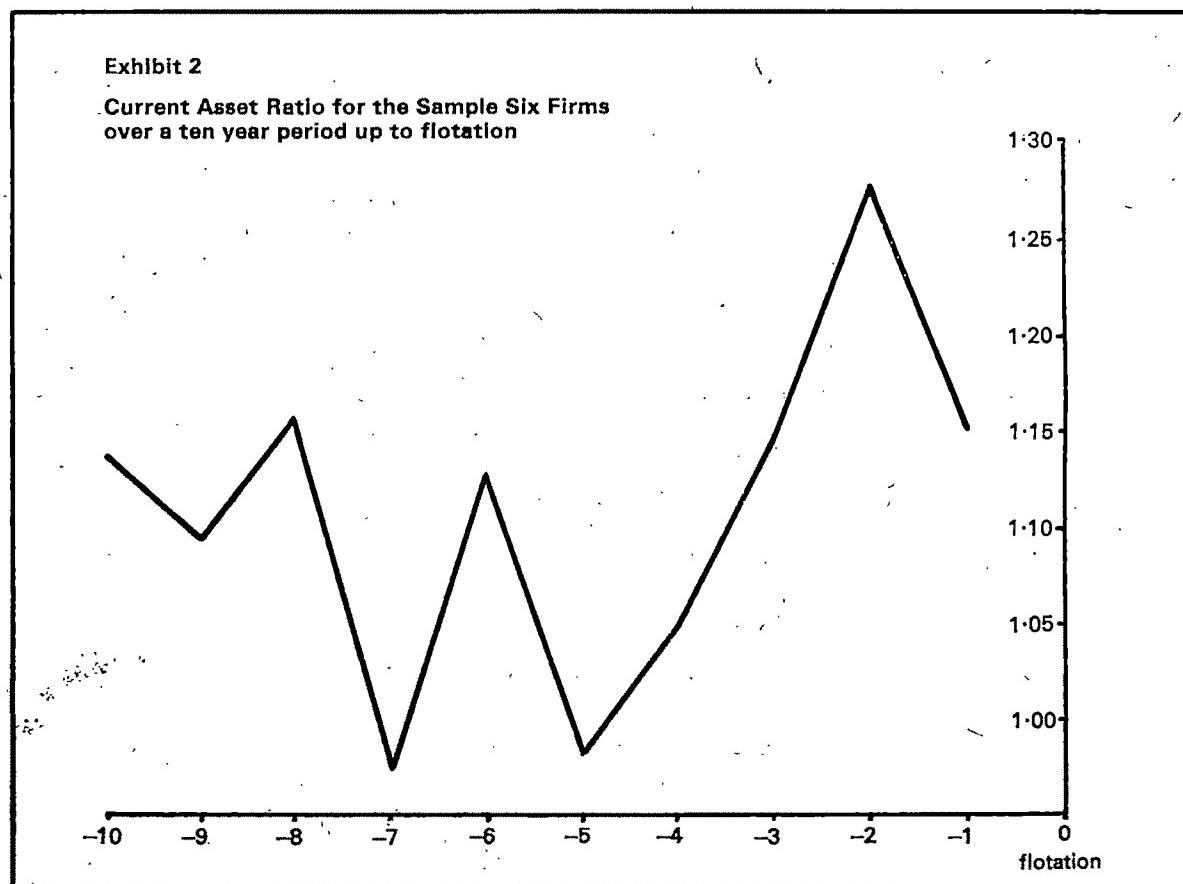
As part of the Bath investigation the executives responsible for finance in the six firms were interviewed in order to learn more of the problems they had encountered in raising finance. It was necessary to establish who was responsible for financing decisions within the firm, whether there was any

explicit policy in this area, where advice was sought, the nature of financing problems, and how they were solved; how the process of obtaining a stock market quotation was tackled and whether raising finance had been a constraint on growth.

It became apparent that all the companies had given a high priority to finance from an early stage. Three companies had a finance director from the start, one had a non-executive director on the board who was a director of a finance company, and in the one case of the company which did not have a director directly responsible for finance (or chief executive with financial expertise), the chief executive appointed a financial director within a few years who had, *ex officio*, been acting as financial consultant to the board in his capacity as auditor.

As far as financial policy was concerned, only one company had an explicit policy from the start in terms of the management of working capital, including cash management, policy towards financing, including, for example, the use of factoring, gearing and so on. In this case, the chief executive and the finance director were both Harvard Business School graduates and so had experience of sophisticated financial management techniques. The policies of the other five companies were not so explicitly stated to begin

Exhibit 2
Current Asset Ratio for the Sample Six Firms
over a ten year period up to flotation



with, but became more so as the companies grew. It is interesting to note that none of the companies used discounted cash flow techniques for project appraisal, this being justified by the chief executive of one of the companies on the grounds that any investment which was not so obviously profitable that it needed DCF appraisal was not worth undertaking.

Finding financial advice seemed to pose no great problem. Two of the companies had stockbrokers as financial directors from the start, one used ICFC extensively for advice, one with the accountant as chief executive used his expertise along with advice from its auditors, one sought advice from a factoring company and finally, one used the non-executive director who was also director of a finance company. All six claimed good relations with their clearing banks which they found useful, but none relied solely on this source. All six had been in contact with ICFC, three without result and three with. Of the three who did not make use of ICFC's services, one turned down their proposition, one was turned down and one was initially turned down but later offered facilities which the company then refused. The three which did take up ICFC's offers all did so in the form of loans.

The main financial problems seemed to occur at two stages; at inception and at the point when growth in sales started to 'take off'. The first problem was the raising of funds to start the business. Only one company started with a large paid up capital, which was necessary for its business as a supplier of venture capital. This was made possible by the fact that the two directors involved were able to raise this sum from relatives, friends and contacts in the City. Two other companies started as 'backyard' type assembling businesses, one of which used bank loans guaranteed by the directors and the other used the discounting of debtors to improve cash flow. One firm started as a wholesaler using trade credit and then moved to manufacturing. The two other businesses required no great initial investment, being service and retailing businesses, and here trade credit provided the initial investment.

When growth came this was financed in two main ways; by increasing use of trade creditors and by the high cash flow nature of the businesses involved. Two of the companies made significant use of ICFC loans; one, which had high but cyclical cash flows, used bank overdrafts, the one which started with a high paid up capital was able to raise more funds in this way by making calls on the unpaid up amounts, and one company made use of hire purchase loans.

Obtaining a stock market quotation is an exercise

which requires good timing and since the six firms had succeeded in obtaining quotations within an average period of eight years from inception, it can be seen that, in terms of speed, they were as a group very successful in reaching this stage. The process of securing a quotation was handled in the following ways. The two firms with stockbrokers on the board relied on them to arrange flotation and another company recruited a stockbroker on to the board for the same purpose. One company's flotation was arranged by ICFC. A director with City experience joined the board of another company and along with the other directors had meetings with representatives from eight different merchant banks before selecting one to manage the issue for them. Finally, the chief executive of one company selected a merchant bank himself after conducting his own survey into those banks available, assessing them by several criteria, and after considering twenty in all, drew up a short list, visited those which were interested, and then made his final choice.

Only two out of the six companies found the raising, or management of, finance a problem. One had problems initially raising funds and another found the management of cash a persistent problem. The executives of the other four claimed that raising finance had been no great problem and was not a constraint of their growth. This seems to be borne out by the fact that only one of the six went public primarily to raise finance. One other had the raising of funds as a secondary objective. The remaining four sought a quotation for non-fund raising reasons, the most important being to enable the shareholders to be in a position to realise their capital gains. Other reasons given were: to enable the company to be nationally known and to facilitate Estate Duty planning.

Summary and Conclusions

The Bath study was limited to only six companies and so it would be dangerous to be dogmatic about the findings. The objective of the exercise was to test certain hypotheses on a small sub-set of the total population in order to refine them before moving on to test them on the total population.

The first hypothesis was the least controversial, that is, that the financial profile of the six rapidly growing companies which went public between April 1968 and March 1973 would be a caricature of that profile shown in the Bolton Committee Report for small rapidly growing companies. With one exception, that of the use of long-term loans, this proved to be correct for the small sample. It is now possible to go ahead and test if the profile of the total population will show greater profitability, less

liquidity in terms of liquidity ratios and level of cash, less distribution of profits and higher levels of both debtors and creditors, than the profile in the Bolton Report.

The second hypothesis was that the financing profile would change as the companies approached flotation. This was difficult to establish, since the small number of observations made were not sufficient to justify a full-scale statistical analysis. However, from the data available, three points emerged for which plausible explanations can be made. First of all, there appeared to be a strong upward trend in profits both in terms of return on equity and net profit margin, such that over the ten-year period profitability started much lower than the Bolton averages but rose to be twice as high. Secondly, the high levels of debtors and creditors reduced as the companies approached flotation and 'normalised' to the levels of the Bolton figures. Finally, liquidity, in terms of the current assets ratio, went through a period of stress, i.e., low liquidity, during the middle part of the ten-year period. As J. A. Bates has remarked there is probably a stage of take-off in the growth of a business and it is probable that there are certain stages of growth where financial difficulties predominate.

The final hypothesis was that rapidly growing companies would experience problems in raising finance. This was not the case with the sample. Only two companies had serious problems and those were overcome. What emerged from the survey was that

ACCOUNTING AND BUSINESS RESEARCH

as a group the companies involved showed a high level of financial maturity, and perception of financing opportunities. Most of them gave finance a high priority from the start in terms of having financial directors on the board and the chief executive himself, with outside help when necessary, showing a high degree of financial expertise. It is significant that three of the six had stockbrokers on the board as they approached flotation. All had developed a fairly sophisticated financial policy on reaching the stage of going public. Between them, they explored most financing possibilities and sources of advice and again it is significant that all of them at some stage approached ICFC. All, except one, claimed that raising finance was no great problem, although it is difficult to decide whether, in retrospect, problems were minimised.

From the Bath investigation the impression gained was that finance and financial advice were always available and that the ability of the six firms to perceive and make maximum use of this contributed to their success. One conclusion of the Bolton Committee was that 'small firms frequently lack knowledge of the appropriate sources of development finance and working capital, and are unaware of the advantages of different methods of raising capital. They are also unskilled in presenting a financial case to potential investors and lenders'. So it would seem that the ability to overcome these inadequacies regarding finance could be a major growth factor.

APPENDIX I
Details of the Companies Studied

	<i>No. of years in operation before going public</i>	<i>General characteristics</i>	<i>Background of founders</i>	<i>First year trading (or 10 years prior to flotation)</i>		<i>Year of flotation</i>
				<i>Profit before Tax (£s)</i>	<i>Turnover (£s)</i>	
A	6	National business Plastic Film Producers and Distributors	Former wholesaler of plastic film	424	61,767	279,268
B	N/A	N/A	N/A	N/A	N/A	1,995,437
C	10	Predominantly regional business, Employment Agency and Executive Selection Agency	Industrial Accountant	(1,061)	47,062	N/A
D	6	National business direct selling of lingerie and clothing	Former Manager in retail distribution organisation	70,050	1,146,925	318,898
E	11	International business Designing and Assembling High Technology valves	Member of International Family Business	(3,027)	30,232	1,116,046
F	9	Manufacturer and Distributor of Electrical Components	Electronics Engineer and Stockbroker Meeting on Harvard MBA	(9,000)	43,000	9,828,446
					470,000	1,382,210
						6,970,000

The Objectives of Published Accounting Reports: Reply to a Comment

Bryan Carsberg, Anthony Hope and R. W. Scapens

In our recent paper, 'The Objectives of Published Accounting Reports', we explained our views on some of the problems which arise in the development of financial accounting theory.¹ We hoped to stimulate debate on this important topic and we welcome the interest shown by Mr. K. V. Peasnell in contributing to the debate.² However, most of his arguments seem to us to be either mistaken or misdirected, and we shall seek to substantiate our views in this note.

The main purpose of our paper was to argue the importance of specifying the objectives of accounting reports; and to consider the range of objectives which might be relevant. In order that the implications of selecting various objectives could be appreciated in general terms, we outlined a method for estimating which accounting measurement conventions satisfy a particular objective optimally. We noted, however, that a full study of the method of analysis would require a separate paper in itself.

The essence of our argument is that accounting should be regarded as a communication of measurements intended to help its users to take decisions. All decisions are based on estimates of future events. It follows that accounting reports can be useful if and only if they lead to improved predictions of relevant future events; and that optimal accounting reports may be defined as those which have most value in a process for prediction. Predictive value is an appropriate criterion for judging the merits of alternative accounting methods. This idea is of fundamental importance. We will illustrate its implications, as we did in our paper, by assuming that one important purpose of accounting is to help shareholders in

taking efficient investment decisions. The decisions will depend on estimates of the future benefits from investment. An accounting report of last year's profits or of the net worth of the undertaking can be useful for investment decision purposes only if it contributes to a process for predicting future benefits. Moreover, one profit measure (or other accounting number) would reasonably be preferred to another if it could be expected to yield the more efficient predictions of future benefits. Even the stewardship objective (as defined in our previous paper pp. 166-7) requires predictions of future events. Stewardship is the management by company directors of resources entrusted to them, in accordance with law; accounts are required, for example, to facilitate the relatively simple prediction of the chances that an action against the directors, alleging illegal practice, would be successful.

Mr. Peasnell objects to our suggested framework on three main grounds: the neglect of 'feedback'; circularity of reasoning; and methodological limitations. We consider each point in turn.

Feedback

Mr. Peasnell expresses the view that 'accounting should encompass both prediction and feedback, but (if a bias has to be shown) with more emphasis on feedback than on prediction.' (p. 71). It is not easy to interpret this statement. We acknowledge the importance of feedback but it seems to us to be properly regarded as an inseparable part of a predictive process. The first step in that process occurs when a decision taker makes a prediction of an event which is relevant to his decision. He will wish to have subsequent feedback telling him what event actually occurred, so that he can assess the efficiency of his predictive process. If an analysis of the difference between his prediction and the actual event shows the need, he will adopt a new process for making predictions. Feedback about the actual event

¹Bryan Carsberg, Anthony Hope and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, Summer, 1974, pp. 162-73.

²K. V. Peasnell, 'The Objectives of Published Accounting Reports: A Comment', *Accounting and Business Research*, Winter, 1974, pp. 71-6.

is of no value *per se*. It is valuable only if it facilitates the making of predictions. The dichotomy between feedback and prediction is spurious.

Mr. Peasnell's argument may reflect the view that predictions should be made using input data other than an accounting report of past results. For example, one method of providing relevant information for shareholders' investment decisions would be the publication, by directors, of explicit long-term forecasts of dividends. (We examine the assumption that shareholders' investment decisions depend mainly on predictions of dividends in further depth below.) The accounting reports could then be confined to reports of actual dividends with additional information which would make it possible to analyse the factors contributing to previous errors in forecasting those dividends. Such an accounting report might be considered to be a feedback report. It would contribute to the predictive process, however, and hence be consistent with the predictive value criterion.

Moreover, we think it unwise to rely on the assumption that the publication of the long-term forecasts required by shareholders will become accepted practice. Explicit forecasts might well represent an ideal reporting method. The main disadvantage of forecasts would be in the possibility that they would be biased in a way that varied from period to period so that the bias could not be detected and corrected by statistical analysis. Whatever the seriousness of this disadvantage, directors are likely to see the publication of long-term forecasts as potentially damaging to the confidence of shareholders; for there is great uncertainty in the business environment and consequently a probability of large forecasting errors. Directors would therefore be likely to resist the publication of forecasts strongly.

If we set aside the possible publication of explicit forecasts, we have only published information about past events available for predictive purposes. Accounting reports might have a limited role in the predictive process if the best predictions of future dividends could be derived from other published information, for example national economic statistics. We think it most unlikely, however, that published accounts for the firm would not improve in any way predictions based on general economic data. Peasnell seems to acknowledge at least that this is a widely held view - he refers in several places to the methods which shareholders appear to use for deriving predictions from published accounts.

In view of the above arguments, we rest on our belief that it is desirable to judge the usefulness of published accounting reports according to their predictive value. More precisely, we believe that the value of accounting reports depends on their ability

to improve predictions made from other data, including general economic statistics. We acknowledge the importance of feedback but we regard it as an integral part of the predictive process. An accounting statement that is useful for feedback will necessarily have predictive value.

Circularity of reasoning

Peasnell has accused us of circularity of reasoning (p. 72). We begin our rebuttal by expanding our original arguments concerning the identity of the variables which should be predicted by an optimal system of financial accounting. We believe, and we stated in our original paper, that shareholders wish to predict the long-term pattern of future dividends on a security for investment decision purposes. Modern financial theory provides strong support for this belief and indicates, more precisely, that the objects of prediction may be assumed to be the expected value of dividends and some measure of their relative risk. The level of future dividends, that is cash flows to the shareholders, will depend on the level of cash flows to the firm and the firm's policy for dividends, reflecting plans for new investment and plans for financing that investment. We stated in our original paper that 'dividends may be assumed to depend on future operating cash flows from established operations and on opportunities to undertake investments in expansion of established operations on favourable terms'. (p. 164). We had in mind that shareholders should predict cash flows to the firm in the first place and then convert the cash flow predictions into dividend predictions by applying an adjustment representing the directors' policy for dividends. Directors might inform shareholders of their dividend policy by a direct published statement. Alternatively, shareholders could infer the directors' policy by studying results over a period during which the policy was applied consistently.

We do not assert that shareholders' investment decisions are based only on dividend expectations. It seems likely that expectations of other events, less easily expressed in money terms, are also relevant. We do assert, however, that dividend expectations may reasonably be regarded as important. Moreover, research into methods of dividend prediction would pave the way for an improved understanding of the contribution of other factors.

It is difficult to interpret Peasnell's suggestion (p. 72) that investment decisions depend on expectations of future changes in the share prices. Share prices represent reactions to expectations about future events. It is usual to regard share prices as secondary events (dependent variables) whereas the prediction process under consideration should be concerned

Methodological limitations

Peasnell criticises us for proposing the mechanical testing of combinations of predictive models and accounting methods (p. 73). We do not understand why he should see as mechanical a process which we see as a challenge to creativity. We are told 'Clearly [sic], Carsberg *et al* do not intend that the accounting profession await its Einstein or Newton, instead they seem to imply that we already have all the models we need...'. The speculation is ill-founded. We are not convinced that all the models worthy of investigation have been described fully in the literature. We suspect that accounting may not yet be ready for its Einstein or Newton. Perhaps we still need a Copernicus to remove the convention of prudence from the centre of the accounting universe - we are not yet sure.

In our original paper, we suggested that the choice of predictive model should be made by conducting tests to discover which of the alternative models would have given the most successful predictions in past periods. Peasnell asserts that the suggestion 'would surprise the economist (because) it implies that the economy is static' (p. 73). We think he is mistaken. Economists build models and test them using data for past periods. They can hardly test their models using data for future periods. The predictive model must be adapted to a dynamic economy. We expect that it should describe a relationship between the cash flows which are to be predicted, past results and macro-economic variables; it would include subsidiary models for predicting the values of the economic variables. A model which excludes such variables is unlikely to give efficient predictions. It is also unlikely to pass the test of ability to have predicted past data - for dynamic change is not confined to the future.

Peasnell's criticisms of our methodology seem to rest on his assumption that we propose to investigate unsophisticated models. We do not know what section of our paper led him to make that assumption. He is in the straw man business again. For example, he may be correct in arguing that 'excessive profits' will tend to be eroded because of competition in the economy - if his expression 'excessive profits' may be interpreted as returns in excess of the equilibrium return. The implication that such a process of erosion could not be represented in a predictive model is incorrect.

Our original paper did, perhaps, seem to make light of the difficulties of developing predictive models. As we have already noted, an adequate discussion of the difficulties would require at least a full paper in itself. We are aware of the difficulties. Hopefully, it will be

with primary variables, expectations of future events, including dividends, which influence share prices. If we take the view that the current share price reflects the expected share price and dividend after one year, then we must acknowledge that the share price after one year reflects the expected share price and dividend after two years. A repetition of such reasoning suggests that the current share price depends on a series of expected dividends into the indefinite future and on an expected share price which is in the indefinite future and therefore has negligible present influence. We do not suppose that it is possible to obtain confident predictions of dividends in the distant future. It does seem likely, however, that the most useful approach to investment decisions will involve use of a model for explicit predictions of dividends for several years, coupled with predictions of their general pattern over subsequent time. Peasnell seems to advocate a model in which current share price depends on future share price, future share price depends on share price further in the future and so on. If he wishes to find an example of pulling oneself up by one's own bootstrap, he need look no further!

Peasnell next asserts that 'if prediction is viewed as the sole purpose of accounting, then circularity of reasoning is involved in the creation of accounting statements' (p. 72). He switches abruptly from a discussion of the prediction of cash flows to a discussion of the prediction of accounting profits. He manufactures a straw man and proceeds to demolish it. His argument is obscure in parts but we attempt the following summary of the main points. Imagine we calculate profit for a firm for each of several successive years and record the results. We obtain a time series of profit numbers. Several different methods are available for the calculation of profits. Each method would yield a different sequence of numbers over time. The optimal method could be defined as the method such that early numbers in the associated time series were the most efficient predictors of numbers later in the time series. Accounting profit would be defined according to its ability to predict its own future values. Peasnell asserts that such a procedure would involve circular reasoning and we agree with him. The objects of prediction, future profits, would have no established relationship with the objectives of the decision takers. However, we fail completely to understand the relevance of this argument to our paper. The process which we suggested involves the prediction of cash flows to the firm and hence cash flows to the shareholder. It does not involve any circularity of reasoning. We did not suggest the prediction of profits at any point in our paper.

possible to develop a model, parts of which may be tested by traditional statistical methods. Other parts of the model may be more complex in form and elements of subjective judgement may be required. We may find that the most efficient model is one in which we can have only a low level of confidence; however, predictions with low confidence are more useful than no predictions. It is possible that we shall fail to find any model that has significant predictive value. However, we cannot escape the logic of the situation. Decisions do depend on predictions of future events. The usefulness of accounting methods for decision purposes may be assessed only by considering their predictive value. If we can find no accounting method which has predictive value, it follows that accounting cannot be shown to be useful.

The value of efficient predictions

There exists a good deal of statistical evidence that stock market prices reflect efficiently all publicly available information. It follows that an investor cannot presently 'beat the market' by using efficient predictive models fed by available information. If more efficient information were to be published, the same situation would presumably prevail. This is not an argument against the predictive value criterion, however, as Peasnell seems to assume (p. 74). The value of efficient information must be sought elsewhere. The essence of the decision problem facing an investor in an efficient market is that he seeks to relate his own wants to the market situation. He compares his own impatience for consumption with the market price for postponing consumption and adjusts his plans to secure the optimal mix of current consumption and investment in relation to that price. Similarly, he adjusts his own level of risk aversion to the price set by the market for risk avoidance. The provision of efficient information will lead to changes in the relative prices of securities (compared to the prices which would prevail following the provision of less efficient information). Shareholders will be able to make improved estimates of the market prices for postponing consumption and avoiding risk; and they will be able to improve their plans for consumption (timing the purchases and sales of securities) and for risk bearing (in terms of the balance of their portfolios). Therein lies the potential benefit of efficient information: in enabling the investor to achieve consistency with the market – not in enabling him to 'beat it'. That is a significant benefit. Moreover, accounting is not concerned merely to enable individuals to improve their peculiar positions. Efficient information may lead to improvement in the allocation of resources in the economy and that may represent a substantial benefit for society.

The surveys

We will not speculate on the reactions of the accounting profession or of any other group to our proposal that accounting should be judged according to a predictive value criterion, (although there is some evidence of support for the criterion by the accounting professions of the United States and Australia.)³ We prefer to believe that the case will stand or fall according to the strengths of the arguments of proponents of the criterion. Peasnell argues that the evidence provided by our surveys gives only limited indications of the attitudes of accountants. We accept that conclusion. Indeed, our original paper noted the limitation explicitly (p. 171) and drew attention to some of the difficulties which Peasnell emphasises – for example, the averaging of points scores given to different accounting objectives (p. 171).

Our purpose in conducting the surveys was to form some broad impression of professional opinion on the question of whether accounting should be restricted to some narrowly defined stewardship objective, as it has been traditionally, or whether it should attempt to satisfy a more ambitious decision taking objective. We believe that our results do demonstrate the existence of substantial support for a decision-taking objective. It is our hope that such a view will soon become generally accepted and be reflected in the pronouncements of influential bodies such as the Accounting Standards Steering Committee.

Peasnell suggests that the application of some statistical tests would have strengthened our conclusions (p. 75). We did not undertake such tests for two reasons. First, we doubted the value of sophisticated analysis of replies to the questions raised. For example, the result that guidance of shareholders' investment decisions is rated more important as an accounting objective than the protection of creditors at some level of statistical confidence would be of limited interest. We believe that most accountants would think both objectives worthy of study and we take that view ourselves. Secondly, we doubted the value of statistical analysis, given the low response rate to the survey and the consequent possibility that the replies were from an unrepresentative sub-group of those to whom questionnaires were sent.

Conclusion

Our original paper outlined an approach which we believe to be of fundamental importance for the development of research in financial accounting

³*Objectives of Financial Statements*, Report of the Study Group on Objectives of Financial Statements, AICPA, New York, 1973 and W. J. Kenley and G. T. Staubus, *Objectives and Concepts of Financial Statements*, Accounting Research Foundation, 1972.

theory. Mr. Peasnell's arguments have not altered that belief. We ask no more than acceptance in accounting of research methods which are now commonplace in economics and business finance. A substantial amount of research will be required to investigate the implications of the predictive value criterion. We hope that the time has come when

ACCOUNTING AND BUSINESS RESEARCH

accounting research in the United Kingdom can finally abandon the vestiges of its negative preoccupation with the shortcomings of present practice or with arguments to suggest that valuable research is too difficult. We hope that accounting research will help to identify positively methods of accounting which have superior value - superior predictive value.

Book Reviews

Cost Terminology and Cost Theory: A Study of its Development and Present State in Central Europe, by Hanns-Martin W. Schoenfeld (Monograph No. 8, Center for International Education and Research in Accounting - University of Illinois at Urbana-Champaign).

This title may not be one that would, in the normal way, cause one to rush round to a bookshop to acquire a copy; nor would the news that 'Central Europe' means for the most part '(West) Germany' probably add much to one's interest. However, your reviewer promises that if you read this book, you will never feel quite the same about accounting in the future. Very few accountants in England or North America realise how parochial their approach to their subject has been, or that a vast literature exists elsewhere, primarily in Germany, whose slant is so different that it just never gets translated or referred to at all. Hanns-Martin Schoenfeld has devoted a good number of years to the formidable task of distilling this material into a single text and this is the result. Sadly, most of us can only deal with this stuff in translation; Kenneth Most translated Schmalenbach's principal work some years ago, but not only is this out of print but the original work is also very old. The most significant development has come much more recently from such people as Konrad Mellerowicz, Erich Gutenberg and, above all, Edmund Heinen, who are totally untranslated, and indeed unknown, in English.

How can one summarise the difference? It is essentially institutional, and hence cultural; readers will be aware that the Stock Exchange plays a more peripheral role in European business finance than is the case in Britain or North America, so that the banks invest much more directly in their customers' enterprises. Although your reviewer is uncertain as to which is the cause and which the effect, it is also the case that the State has concerned itself much more with the detailed regulation of commerce, and

that since the time of Bismarck. It would seem that our belief that the success or failure of a business could only finally be tested in a 'market' of some sort, leads us to believe that we can extract all that there is to know about a firm's economic (and social?) status from an examination of the financial transactions of the firm and of its shareholders, and so to view accounting as something which is self-sufficient. In contrast German cost-theorists always present accounting transactions as two-sided phenomena - the real physical activity and the valuation placed upon it. Many readers will have heard of this approach through Yuji Ijiri's work, which is not surprising since the German theory is also followed in Japan. It would be rash to suppose a positive correlation between cost-theory and economic miracles - but its supporters are less likely to embrace the fallacy of believing that it is possible to 'make money' without making anything else.

The result of a self-justifying accounting theory is simply the idea that 'fixed costs' and 'variable costs' are meaningful concepts. They are, of course, if one thinks it a reasonable thing to take the levels of expenditure at various levels of activity and run a regression line through them. Not only does this simple minded process invite the extrapolation of the line into areas for which no supporting observations exist, but it also implies the continuity, and usually the linearity, of the line itself. Oddly enough, such empirical studies as have been done in this matter, such as those of P. J. D. Wiles and John Johnston, give some support for the L-shaped cost-curve which linear regression implies. However, deductive reasoning finds this curve very difficult to accept. Obviously, the German theorist is less likely to find himself in this dilemma, because he is looking at the activity of the plant and so on and only pricing them out as an afterthought. How does this actually work? Heinen tries to identify a number of what he calls 'E-combinations', which are basic processes for

which the input-output relationships are certain; he then considers how these basic processes can be made to interact. This interaction requires differing levels of activity in the several processes over a period of time, and so can convert entirely 'sensible' cost-curves for the individual E-combinations into most elaborate concoctions for the operation as a whole. Also he suggests that the number of possible interactions is decidedly limited, so that the resulting curves are by no means continuous.

One must ask how this sort of thing could help Arnold Weinstock make another fourpence. Your reviewer thinks it can, notwithstanding that it clearly substitutes considerable complexity for our nice straightforward Anglo-Saxon approach to costing. In fact, this is another area where one has to decide whether the basic econometric methodology of 'top-downwards' statistical inference on the basis of an *a priori* identification of significant variables will produce a satisfactory result. Obviously it may well produce a good result in the observation period itself, in the sense that the regression line is a 'good fit'; how it will function as a forecaster of the future largely depends upon whether the underlying machinery is going to remain unchanged. In such a case it may do well enough, but where change is occurring only a 'bottom-upwards' aggregation based on the detailed behaviour of the real underlying processes is going to be of much help.

It would not be correct to say that these German writers are the fountain of all truth, and indeed there is a notable omission from their thinking. However, Professor Schoenfeld is to be complimented on pointing it out in the course of his very excellent survey. On page 120 he observes 'The proper determination of labor consumption in terms of "quantities" used is at least theoretically unsolved, particularly because the technical-mechanical view of production theory most certainly does not do justice to the problem. Production theory on the other hand is incomplete if this major input factor is disregarded. Therefore it resorts to a system-adequate, problem-inadequate treatment regarding the human being as a production factor, like a machine . . .' One must hope that the current concern for human resource accounting and the like will eventually enable this approach to encompass both subjective and 'mechanical' networks.

This book is essential reading for anyone who makes his living by talking about accounting, but no less vital a purchase for anyone who seriously claims to run a business – otherwise than by the seat of his pants.

Trevor Gambling

Accounting in Scotland: A Historical Bibliography, compiled by Janet Pryce-Jones, annotated by R. H. Parker. Published by The Scottish Committee on Accounting History, The Institute of Chartered Accountants of Scotland. Price £2.50.

In 1970 people from various countries interested in the history of accounting met in Brussels at a conference made possible by the efforts of Mr. E. Stevelinck and his Belgian professional colleagues. One result of this gathering was to stimulate interest in research in the history of accounting, and organisations with this purpose have been established in a number of places. It is to be hoped that these organisations and their members will successfully initiate and pursue studies in this relatively under-developed field, in which, moreover, serious scholarship has suffered severe losses in the last year or two by the deaths of four distinguished and productive scholars, A. C. Littleton, Raymond de Roover, Federigo Melis and Onko ten Have.

Of the new organisations formed since 1970, the Scottish Committee on Accounting History has got off to a quick start with the present publication, financed with the help of the Scottish Institute, the University of Dundee and nine firms of accountants. This useful work lists books published in Scotland on accounting, book-keeping and commercial arithmetic between 1683 and 1920, as well as published transcriptions and discussions of Scottish accounts (before the early 1800s) and publications on Scottish accounting history. The list of books published makes up the largest part of the work. Professor Parker's annotation of a number of items are of a biographical nature or refer to aspects of the books annotated; they whet the appetite for a comprehensive study of development of works on accounting published in Scotland. Parker properly gives prominence to the four major authors of the eighteenth century – Malcolm, Mair, Gordon and Hamilton. In a book published in 1813 by a fellow-countryman, James Morrison, 'Accountant, Master of the Mercantile Academy at Glasgow' (the book, *The Element of Book Keeping . . .*, was published in London and is hence not listed in the *Bibliography*), the last three are singled out for praise and are crisply characterised as: 'the elaborate MAIR, the ingenious GORDON, and the judicious HAMILTON'. Their books are excellent expositions of contemporary practice, simplified somewhat for teaching purposes. It is interesting that the *Bibliography* quotes a later author referring in 1861 to one of Mair's works as 'a work elaborate, and now almost unintelligible' – a comment indicating, perhaps, a shift of interest to accounting arrangements for more specialised commercial or industrial operations.

The value of the present work is enhanced by the indication of locations of copies of the listed books in twelve libraries, the inclusion of several illustrations (some portraits and specimen pages of selected books), and the addition, in an appendix, of a detailed study by Parker of the first book on accounts published in Scotland, *The Idea Rationaria* (1683) of Robert Colinson.

B. S. Yamey

Analysis for Investment Decisions. Bryan Carsberg. Accountancy Age. 1974. pp. 230 + xv. £4.80 hardback, £2.50 paperback.

More than anyone else, Fisher is the theorist of the modern revolution in the teaching and practice of finance. Professor Carsberg's book will leave a well-marked footprint in the path along which lies the expansion and development of the Fisherian ideas for application in practical finance. Some teachers of finance and accounting (and the one cannot be taught properly without the other) will indeed think its major contribution lies in the lucidity with which it demonstrates for the student the relation of the technical apparatus of compound interest (DECF in current jargon) to the basic financial objectives set by consumer preferences. This alone is enough to show its value, for it is a fair bet that more than half the users of the apparatus of discounted cash flow would be hard put to it to demonstrate clearly the rationale of the method.

The book is elementary in the best sense of the word, in that it achieves exposition of fundamentals with great simplicity, readability and elegance without sacrifice of logical rigour. Teachers of the subject should be grateful, for it fills a most obvious gap in the British literature for honours courses in finance and accounting, and for the recently revised syllabuses of the various professional accounting bodies. It is also a first-class introduction to more advanced work.

The book divides broadly into two sections, at a somewhat different level. The first nine chapters, the first part of chapter 10, and chapter 12, provide a basic grounding for financial study and require virtually no mathematical knowledge beyond a little ordinary-level arithmetic and a few simple formulae. It may fairly be said that if all British financial executives and their assistants knew – and understood – the material in these chapters, the standard of financial management in this country would be significantly raised. This part of the book covers the general theory of investment choice, including an introduction to the treatment of risk and uncertainty, the treatment of inflation, the impact

ACCOUNTING AND BUSINESS RESEARCH

of taxation (in detail that is unusual, and correspondingly valuable, in financial texts), and the more elementary aspects of capital rationing. Finally there is a chapter on the relation of accounting measurements based on the historic cost convention to investment decisions – a chapter that should shake the faith of some practising accountants and investment analysts in the usefulness of calculations of rates of return and price-earnings ratios based on such accounts.

The remaining part of the book deals – still at an elementary level – with matters that will be more easily followed by those who have followed or are following courses in elementary probability and statistical estimation, and who are not put off by the more extended use of algebraic symbols. This does not imply that there is nothing for those without these attributes, for the remaining chapters can be read at more than one level. Reading at a general level, and skipping the algebra, the reader will become aware of the direction in which the subject is moving and of matters he should inform himself about or call on others for advice on.

This section of the book necessarily delves less deeply into basic theory and is to be regarded more as an introductory survey of more advanced parts of the subject. The matters covered include the role of linear programming in financial planning, the idea of the general decision model of the firm, models for estimating the effect of given policies on the value of a firm's shares – a chapter that has considerable significance for the general subject of share valuation – and theory underlying policy on diversification of investment.

By and large I think the book will be more useful when linked to a good teaching course than when used as a self-teacher, though it has much to offer the more intelligent student working on his own and the practical man who wants to improve his theoretical background. It is impossible to write a new work of this description without occasional minor blemishes, but the number I think I have spotted in this one is small. If I have any material disagreements with the author they are, first that his definition of what is 'scientific' is narrower than I think is justified by current philosophical views. Second, his use of the term 'opportunity cost' is I think unfortunate, in that he seems to limit it to situations where rationing imposes choice inside the organisation, whereas under normal usage the term is valid in the context of any situation where choice has to be made. These, however, are small matters compared with the contribution which I think this book will make to the literature of finance and accounting.

H. C. Edey

Contributors to Accounting and Business Research

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Contents

Objectives and Methods of Financial Reporting: A Generalised Search Procedure	Peter Bird	162
The Distorting Effect of Surplus Advance Corporation Tax in Project Appraisal	Adrian Buckley	168
Manipulation of Earnings Figures in the United Kingdom	R. C. Morris G. H. Breakwell	177
A Critique of Historical Record Accounting	Ian Tilley	185
Rationality and Investment Appraisal	David J. Cooper	198
A Systems Model for Accountants	R. N. Berry	203
Multiple Optima and Sensitivity Analysis in the Product Mix Problem	Patrick B. McKenzie	213
The Financial Control of Rapid-Growth Firms up to Flotation	P. J. Hutchinson J. A. Piper G. H. Ray	222
Tax Uncertainty in Project Evaluation: A Case Study	A. J. H. Orhnial L. P. Foldes	229
The Lease Evaluation Solution: A Comment and Alternative	John R. Grinyer	231
Book Reviews		235
Notes on Contributors to this issue		239

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Objectives and Methods of Financial Reporting: A Generalised Search Procedure

Peter Bird

It seems to be now acknowledged that the appropriateness of any method of financial reporting in any circumstance can only be judged by its success in furthering the objectives of that financial report. The long overdue acceptance of this near-tautology gives an opportunity to set the search for appropriate methods of financial reporting on a firm foundation of a very general and therefore powerful nature. Carsberg, Hope and Scapens¹ point the way; but both in their own writing and in their references to previous researchers they indicate a willingness to sacrifice some of the generality by dealing exclusively with businesses and a tendency to skate rapidly over the initial steps so as to get to the details of the inevitable example of accounting reports designed for financially-motivated business investors. This paper seeks to redress the balance in these respects; it also draws out how responsive the financial reporting process needs to be to the personal value systems of the readers of financial reports.

A generalised statement of the basic objective of financial reporting is inevitably almost a definition of what a 'financial report' is. It is usual to confine the term 'financial reports' to statements issued outside the entity to which they refer, and so to distinguish them from 'management accounts' which circulate within an entity. Both these forms of accounting statement consist of classified and summarised financial data. The preparation of financial reports is a service activity; at its lowest, the objective of financial reporting is therefore to render a service which someone is prepared to pay for. Someone will be prepared to pay for accounting reports if and only if they communicate effectively² to him financial data

which he did not previously know about and which are relevant to decisions which he has to take. Thus the objective of financial reporting must be to provide financial data which are relevant to decisions faced by recipients of the report.³ In the long term, a financial reporting process which failed to satisfy this objective would be faced with refusal to pay for its output – though legal and institutional factors might delay the coming of that day of judgment.

This statement of the basic objective of financial reporting demonstrates the unifying characteristic of all financial reporting. But, since entities and parties interested in them come in great variety, it also gives a clear hint that appropriate specific forms of financial report will vary among recipients and types of entity being reported upon. And the statement of objectives makes it clear that the search for each of these appropriate forms of financial report will involve identifying entities, interested parties, decisions faced and decision criteria.

There are three reasons why a search procedure should be specified in such a way that it can be used both for considering the needs of investors in companies (which may in practice take priority in research time) and for considering other interest groups and other forms of organisation which use economic resources. First, in Britain and other 'Western mixed economies' today a substantial proportion of economic resources is under the control of organisations other than businesses financed by private individuals. These other organisations have many forms, including central and local authorities, nationalised industries, building societies, co-operative societies, health authorities, universities, churches, charities, trusts, clubs and associations. The duties of accountability which many of these types

¹Bryan Carsberg, Anthony Hope and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, No. 15, Summer 1974, pp. 162-173.

²On the communications aspects of accounting statements see Peter Bird 'Standard Accounting Practice', in H. C. Edey and B. S. Yamey, 'Debits, Credits, Finance and Profits', Sweet and Maxwell, 1974.

³This general statement of the objective of financial statements is in agreement with that of the AICPA Study Group ('Objectives of Financial Statements' AICPA, 1973) and of the Australian Accountancy Research Foundation study (W. J. Kenley and G. J. Staubus, 'Objectives and Concepts of Financial Statements', Accounting Research Foundation, 1972).

of organisation owe are very ill-defined, even by comparison with those of companies. This means that it is not clear what the objectives of these organisations 'ought to be', or (to rephrase this so as to avoid attributing objectives to an organisation) what parties have a legitimate interest in defining limits to their freedom of action. It is true that companies do use the services of a very large number of professional accountants — a number out of proportion to the share of companies in total national economic resources; but a substantial number are working with non-business organisations and are at least as much in need of research support as their business counterparts. The financial reports of most non-business organisations in Britain have to date been rather crude adaptations of the conventional form of company published accounts. This has always been unsatisfactory; but it may become much more inappropriate if and when company accounts come to be firmly based upon the objectives of investors and other parties interested in companies who have no direct counterpart in these other forms of organisation.

Secondly, it is too parochial for a general framework to confine its attention to a form of organisation which is only prominent in Western Europe, the United States, the 'old' Commonwealth' and a few other countries. Accounting is practised, accountability obligations are owed and discharged in all economies, irrespective of their stage of development, their dominant political philosophy and the resultant institutions. The accounting researchers and profession in any country will naturally wish to devote most of their attention to those institutions which are significant at that time and place. But where possible they should do this within a framework that can also be applied to 'alien' forms of organisation. The study of financial reporting problems in 'alien' societies or in non-business organisations in Britain can also be expected to yield some insights into the business situation analogous to those given into our society by social anthropological studies.

Thirdly, the orientation of business activity in Britain may well change over the fairly near future more rapidly and more radically than it has done previously in this century. The idea that a company is accountable only to its shareholders is being called into question. Many ways of recognising the employees' interest in their employer are being discussed — from the European ideas of workers on supervisory Boards of Directors and the recognition of employees as 'members' of the company to co-ownership and workers' co-operatives. At the same time, social and economic changes are taking place which must make it doubtful whether private

individuals and institutions representing groups of individuals will be able and willing in the future to subscribe the risk capital to support as much of industrial and commercial activity as previously. Whatever their individual opinions, it is not for accountants as a profession to defend the *status quo* or espouse any of the proposed alternatives. But they should be in a position to draw attention to the accountability problems of each and to have thought through the solutions to these problems as far as possible.

For ease of exposition the search procedure will be described as a universal once-only exercise. But it is to be undertaken in practice as a learning process to be repeated at intervals to take account both of changes in the social and economic context of financial reporting and of new evidence which serves to modify the provisional answers given previously to the questions asked in the search procedure. In practice it is likely that the process will be tackled piecemeal, with various individuals or groups giving their attention to particular types of organisation. The universal form of statement of the search procedure will serve both to encourage a common approach to the different types of organisation and to draw attention to the gaps in the piecemeal study of the total problem.

Step A. List all the distinct types of entity (including individuals as well as organisations) which use economic resources. Entities are of different types if they produce different answers at subsequent steps in the search process; it may therefore be necessary to amend the list after proceeding further in the search. As a general rule it is advisable to classify more rather than less finely, as it is easier to combine classes than to divide them at a later stage.

Step B. For each type of entity listed at A, list all the groups who have recognisably separate and distinct interests in that entity. The search for a list of interested parties is already a lively issue in discussion of the obligations of companies. It would be a salutary exercise to undertake for other organisations in which there appears at first sight to be an accountability vacuum, such as building societies and the Crown Agents, or accountability confusion such as nationalised industries and universities. One test of the reality of interest in an entity is whether the group is prepared to pay for the preparation of some form of financial report.

Step C. For each group of interested parties listed at B, list their objectives in relation to the entity concerned. (Note that at each step it becomes increasingly important to be prepared to make, and state, assumed answers to questions upon which

evidence is not adequate to answer with a high degree of confidence; the deficiency of evidence on certain points serves to indicate directions for research but not to direct abandonment of the search process pending completion of the research.) It is important to distinguish clearly between the objectives of financial statements, which accountants have a duty to establish both in general terms and in operational detail, and the objectives of interested parties which those parties alone have the right to dictate and which then form one step in the search for the attainment of the objectives of financial statements. The objectives of any party in relation to any economic organisation must have financial implications; but it should not be assumed without clear evidence that, even in business, objectives are themselves exclusively in the money-seeking or money-saving dimension.⁴

Step D. For each objective listed at C (or possibly for a compatible combination of objectives), list the decisions which the interested party may take in the furtherance of its objectives in relation to the entity under consideration. It is only when a party is faced with the necessity to choose one course of action and to reject other possible courses that he will value (and be prepared to pay for) information to assist him. A few people make a living from communicating data to people who are highly unlikely to make use of them in taking decisions (in Wisden and the Guinness Book of Records for instance). But the market for such data is too restricted to form a sound basis for the profession of accountancy. Financial data are here described as 'Information' only when they are communicated to people for whom they are decision-relevant.

Step E. For each decision listed at D, list the direct data inputs which the decision-makers require to implement each possible decision rule. At this stage these inputs are to be listed even though it is clear that they cannot be known at the time the decision is to be taken, e.g. because they relate to events which at that time lie in the future. It has to be recognised that many decisions taken by parties in relation to organisations are based wholly or partly on factors which cannot possibly be reflected in anything called a 'financial report' – though we should not be in too much of a hurry to reject anything that can be quantified whether in money terms or not.

⁴It is interesting to question what would have been the outcome of the thalidomide claims against the Distillers Company if the company's policy had been decided by a free vote of the beneficial owners of its equity shares (not any financial institution intermediaries) instead of by a board of directors that sought to protect their financial interests only.

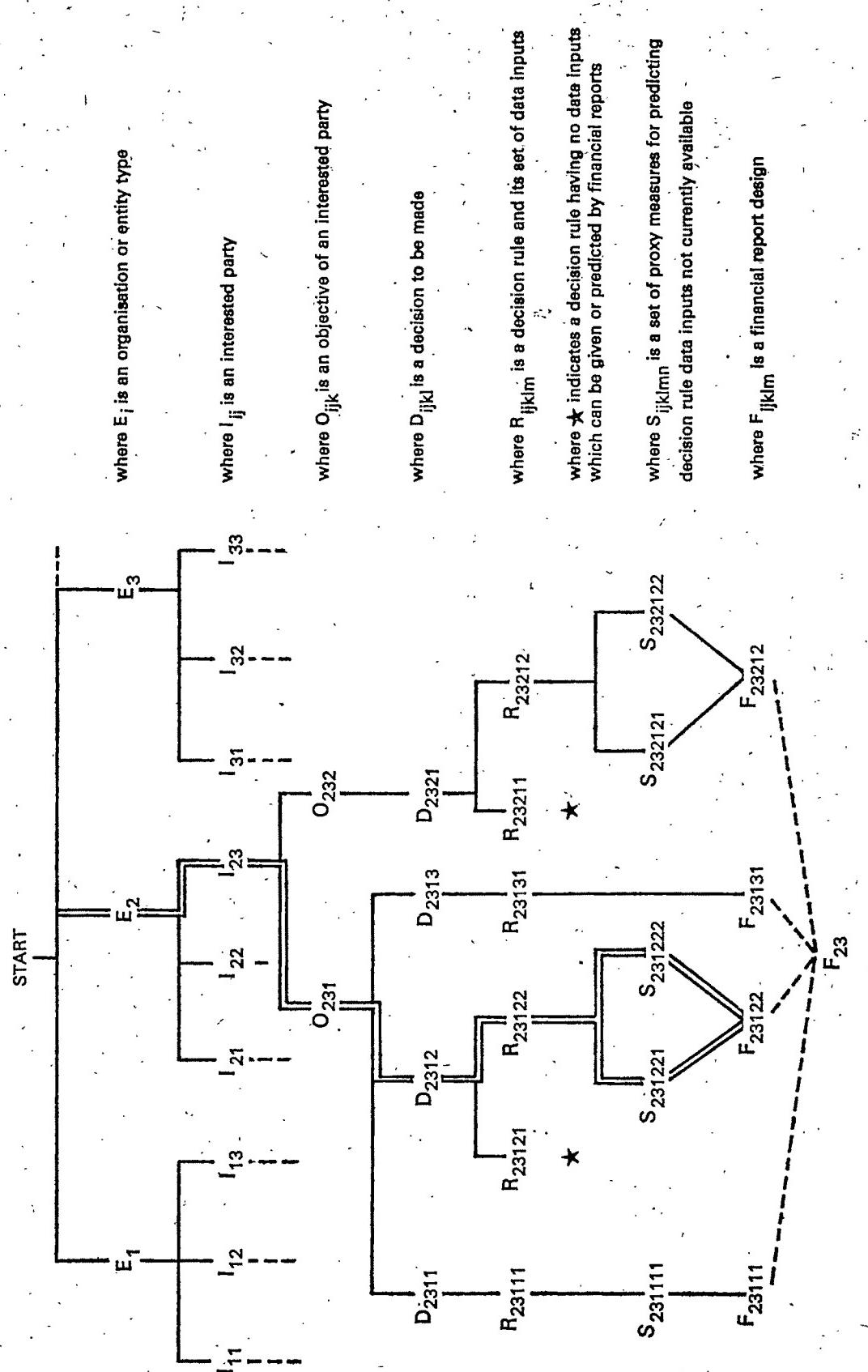
It is necessary to decide at this stage whether the data inputs to be listed are those which are observed to be used (in so far as they are by present practice made available) or asked for; or whether they are those which the professionals consider *ought* to form the basis of the exercise of rational choice. As a service activity accountancy must try to give the customer what he wants; at the same time it is a proper professional function to try to educate the customer into wanting something better. While this double process is being undertaken, financial reports may well have to include both what is used and what ought to be – except where accountants can be so confident and unanimous that what has been used is inferior to what they recommend that the former should be suppressed. It should be noted that at this stage, for the first time, the possibility is raised that the accountants may be wiser than their customers and justified in overruling them. If they do overrule, it must be on the grounds that they can see a better way of attaining the objectives specified by the customers – which the accountants have no right to query.⁵ Note also that it is not necessary to specify how the user of the accounts will interpret the data inputs or ascribe functional relationships to them in a decision model. All decision models that use the same data inputs can be grouped together in this step. It is only where the data inputs vary that they must be considered to be a distinct set.

Step F. For each data input listed at E which is not available at the appropriate time either at all or within acceptable cost limits, list the proxy or surrogate measures which evidence suggests will act as the best predictors of the unobtainable data. Evidence will be provided by the testing of models for their ability to predict future events or amounts that it is not feasible to measure until some future time. But as at earlier steps it may be necessary, at least as a transitional provision, to include data which users of accounts are known to use as predictors as well as data which accountants consider to be capable of acting as superior predictors of the data inputs wanted at E. The measuring and publication of surrogate measures is, however, a process involving cost and each measure justifies its inclusion only if its marginal benefits exceed its marginal costs.

Step G. For each decision listed at D, design a form of financial reporting which will furnish such directly relevant data inputs as are obtainable, as listed at E, and such data surrogate measures as will

⁵A few years ago accountants used to urge their clients to emigrate to tax havens. Now they tell their clients how much tax such a move would save and what living conditions in the tax haven are like and ask them to sort out their priorities for themselves.

FIGURE 1



act as predictors for the other decision data inputs, as chosen at F. Where possible the measures relevant to all the various decisions faced by one interest group in its relations with one entity should be grouped into a single set of financial reports. However, the limited span of attention of readers of statements may overrule this general desideratum. But the directing of financial reports at a specified interest group will enable information to be conveyed in a more compact manner as it will be possible to give the language used in a particular context a more precise meaning that is standardised and known to the addressees of the reports.

Instead of trying to complete the list required at one step before proceeding to the next, it is more likely in practice that researchers will select one type of entity at Step A and then move straight to selecting one interested group at Step B and so on, narrowing their attention further at each step. This approach is illustrated in Figure 1 with the selected path marked by a double line. Either the same or other researchers will then investigate other 'forks in the road' which were ignored on the first run through. The whole process of successive looping back until all roads have been explored is illustrated in Figure 2. When, or even before, this whole process has been completed, it will be time to start repeating it to incorporate the results of research the need for which had been demonstrated by the previous 'run' through the search procedure. This learning system would only come to a stop in the event of its output reaching perfection - an event whose probability is given its final push towards zero by the fact that the social and economic context of the financial reporting task is always changing and demanding new responses from the financial information function.

In two respects the significance of this search

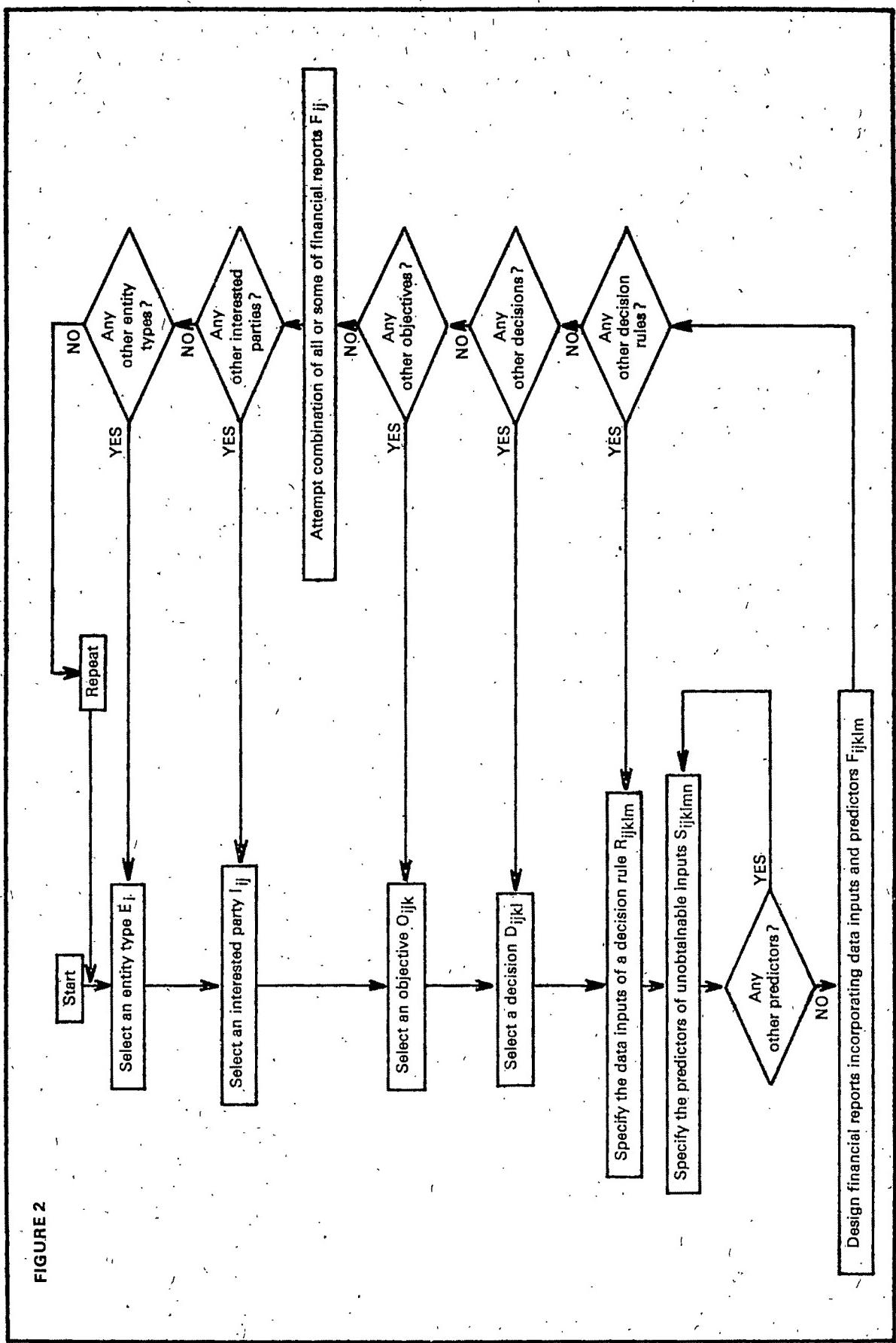
procedure is even wider than has so far been shown. First, the procedure described here in relation to whole organisations is equally applicable to segments of businesses, that is, to a major section of what is often known as 'management accounting'. The problems of measuring divisional performance have more in common with those of external financial reporting than with the rest of cost and management accounting with which they are often grouped.

Secondly, the whole auditing activity is directed to giving interested parties independent assurance about aspects of organisations - or, in the case of internal auditing, of segments of organisations. The content of auditing will therefore depend upon what interested parties want to be assured about, that is, upon the answers to some of the questions in the search procedure outlined above. Auditors will probably be called upon to give opinions on whatever forms of financial reports are derived from the search procedure. They may also be asked, as a result of answers given during the search, to give opinions on other matters which do not feature explicitly in the financial reports, such as the adequacy of administrative systems.⁶

This paper does not give an answer to any of the problems facing financial reporting. Its limited aim is to persuade researchers to ask the relevant questions in the right order so as to follow a systematic search for improved financial reporting methods, and to seek the answers to those questions in the right quarters - which at several important steps means from the interested parties concerned and not from expert groups of accountants.

⁶See Peter Bird, 'The Scope of the Company Audit', *Accounting and Business Research*, No. 1, Winter 1970, pp. 44-49.

FIGURE 2



The Distorting Effect of Surplus Advance Corporation Tax in Project Appraisal

Adrian Buckley

It is the contention in this article that the UK imputation tax system can, in certain circumstances, radically distort the incidence of cash flows in project appraisal. The situation to which this paper refers embraces UK cash flows accruing to and capital expenditures made in the UK by companies with substantial unrelieved advance corporation tax. Companies may find themselves with unrelieved ACT where they pay dividends but have a high proportion of overseas earnings, or tax losses or capital allowances brought forward which effectively defer for some years the full liability to corporation tax. This situation affects a significant number of UK companies. Assessing a company's exact tax status is very difficult given published financial information. Thus, it is impossible to be certain, without polling a sample of companies, as to how many companies fall into an unrelieved ACT situation. Examples of companies which, it is thought, fall into a surplus ACT category would embrace some with a large proportion of overseas earnings (Rio Tinto Zinc, British American Tobacco), some with large UK capital expenditure programmes relative to UK profit (William Press, British Oxygen), some with losses brought forward (Trafalgar House, Thos. C. Keay), some currently making losses (BLMC), and some with UK profits just in excess of dividend (Concrete Ltd., Walmsley (Bury) Ltd.).

In an unrelieved ACT position, the company will be required to pay ACT in respect of qualifying distributions despite the fact that its corporation tax liability may be nil. Although the unrelieved ACT can be carried forward and is available for set-off against future UK corporation tax, it is in the meantime that an anomaly is created.

The anomaly explained here effectively means that where a company has surplus ACT brought forward and there are taxable profits against which capital allowances can be set, then the reduced tax benefit accruing in cash flow terms following UK investment

attracting, for example, a 100% first year allowance accrues at the rate of:

- the minimum mainstream corporation tax rate, at present 17%, on the capital cost in the year following investment
- the difference between the corporation tax rate, and the minimum mainstream rate, at present 35%, on the capital cost in the year in which surplus ACT becomes relieved.

On the other side of the equation, the incremental income arising in the UK and accruing from the investment is taxed, in cash flow terms, at:

- 17% of profit until surplus ACT is relieved¹
- in the year in which surplus ACT becomes relieved and thereafter, the rate of 52% applies
- furthermore, in the year in which surplus ACT becomes relieved, tax is payable at 35% of aggregate incremental profits from the inception of the project to that year.

It will be observed that until surplus ACT is relieved, the marginal rate applied to profits is 17%, which reflects the fact that the ACT set-off cannot be used to reduce the balance of corporation tax below 17% of taxable income – this is the minimum mainstream corporation tax rate.

The above situation applies where there are taxable profits against which capital allowances may be set. Where there are no taxable profits available against which to utilise capital allowances – perhaps because of substantial losses brought forward – the position is more complex. In this instance the company will move through three distinct phases.

¹Rather than repetitively using the term minimum mainstream corporation tax rate, the quantified amount, namely 17%, is used henceforth. Similarly, rather than referring to the difference between the corporation tax rate and the minimum mainstream rate, the quantification of 35% is used. If the precepts of this article are being applied some time in the future when tax rates have changed, the reader should allow for the appropriate rates of taxation.

Firstly there will be a period when there are no taxable profits; this will be followed by a period in which surplus ACT will result; when the surplus ACT is relieved the normal tax position will be entered. Thus, following the implementation of a profit earning project, no tax will be payable and no capital allowances benefit will accrue, in cash flow terms, until there are taxable profits. When this time is reached the above rules will apply, but additionally in the year in which there is a transition from no taxable profits to an unrelieved ACT situation, all profits (incremental to the project) to date are taxed at 17%.

Justifying the above assertions, this paper shows, via a series of numerical examples, the effect upon cash flow of projects under the following assumptions:

- taxable profits and no surplus ACT
- taxable profits and surplus ACT
- no taxable profits in the short term, followed by a period of taxable profits and surplus ACT.

For convenience in the examples shown below cash flow and profit are used interchangeably. Admittedly this hardly simulates reality, especially in a period of high inflation. But the models used in this paper are concerned essentially with cash flow distortion in project appraisal whilst surplus ACT persists rather than with the divergence between cash flow and profit in high inflation periods. In fact if this approach is adopted, allowance can be made for the divergence between profit and cash flow by way of additional working capital needed by the project.

Taxable Profits and no Unrelieved ACT

As a necessary introduction to expounding the reasons for the view expressed with respect to situations with surplus ACT, it seems worthwhile to begin from the less complicated position where ACT is wholly relieved.

Assume that the world is one of total certainty, and the company's trading and tax position is as summarised in Exhibit 1. Thus its taxable profit is £1 million for each of the three next years; it pays a

dividend of £300,000, implying ACT of £162,000 and, since there is no surplus ACT brought forward, the mainstream corporation tax amounts to £358,000. This gives a total tax bill of £520,000. For simplicity the lagging of tax payments has been disregarded.

Now, if on this situation we superimpose an additional capital project costing £300,000 in year 1, and for the moment we assume that it gives rise to no incremental income, we obtain the position indicated in Exhibit 2. In this exhibit it is assumed that the whole of the project attracts 100% first year allowances. Exhibits 1 and 2 indicate, in the total tax payable row, that the tax saving based on capital allowances amounts to £156,000 - given by £300,000 at 52% - in year 1.

EXHIBIT 2

	Year 1	2	3
Figures in £000			
Profit	1,000	1,000	1,000
Capital allowances	300	nill	nill
Corporation tax at 52%	364	520	520
Dividend	300	300	300
ACT	162	162	162
Mainstream corporation tax	202	358	358
Total tax payable	364	520	520

In Exhibits 1 and 2 we looked only at the investment side of the incremental project. Let us now look at the other side of the equation. Assuming that, superimposed upon the position in Exhibit 1, we add further profit (and cash flow) of £100,000, the position is reflected in Exhibit 3.

EXHIBIT 3

	Year 1	2	3
Figures in £000			
Profit	1,100	1,100	1,100
Corporation tax at 52%	572	572	572
Dividend	300	300	300
ACT	162	162	162
Mainstream corporation tax	410	410	410
Total tax payable	572	572	572

It will be noted in all of the exhibits that dividend policy is given. It will also be observed that the difference between total tax payable in Exhibit 1 and in Exhibit 3 amounts to £52,000 per annum, given by £100,000 x 52%.

Evidently, the position where we have a situation uncomplicated by unrelieved ACT is that the relevant rate of corporation tax to be applied in project appraisal is 52%. The positions in Exhibits 2 and 3 are brought together in Exhibit 4, which thus assumes investment of £300,000 giving rise to

EXHIBIT 1

	Year 1	2	3
Figures in £000			
Profit	1,000	1,000	1,000
Corporation tax at 52%	520	520	520
Dividend	300	300	300
ACT	162	162	162
Mainstream corporation tax	358	358	358
Total tax payable	520	520	520



profit and cash flow of £100,000 per annum.

EXHIBIT 4

	Year 1	2	3
Figures in £000			
Profit	1,100	1,100	1,100
Capital allowances	300	nil	nil
Corporation tax at 52%	416	572	572
Dividend	300	300	300
ACT	162	162	162
Mainstream corporation tax	254	410	410
Total tax payable	416	572	572

Of course the above exhibits exclude the means by which the money to finance the project is raised. Would the relevant tax rate for project appraisal have been any different had we included the need to raise money to finance the project by way, say, of an equity issue on which the company paid an effective 10% net dividend yield? Intuitively, the answer is no; Exhibit 5 shows an example of this situation. It will be noted that total tax payable remains the same as in Exhibit 4. The method of financing and dividend policy are immaterial in terms of confronting the problem of the incidence of cash flows where there is no unrelieved ACT problem.

EXHIBIT 5

	Year 1	2	3
Figures in £000			
Profit	1,100	1,100	1,100
Capital allowances	300	nil	nil
Corporation tax at 52%	416	572	572
Dividend	330	330	330
ACT	178	178	178
Mainstream corporation tax	238	394	394
Total tax payable	416	572	572

All of the figuring above has related to the situation where the company has no surplus ACT. Let us now go a step further and look at the situation where it has taxable profit and unrelieved ACT.

Unrelieved ACT and Available Taxable Profits

As an example of this situation assume that a UK company has a taxable profit of £1m., pays a dividend of £300,000 but has unrelieved ACT brought forward at the start of year 1 amounting to £500,000. In such a circumstance, ACT will total £162,000 per annum, and in years 1 and 2 the only other corporation tax paid will be at the minimum mainstream corporation tax rate of 17% on taxable profits, surplus ACT brought forward being set against mainstream tax in

ACCOUNTING AND BUSINESS RESEARCH

excess of the minimum amount payable. Exhibit 6 details numerically the financial implications.

EXHIBIT 6

	Year 1	2	3
Figures in £000			
Profit	1,000	1,000	1,000
Capital allowances	nil	nil	nil
Corporation tax at 52%	520	520	520
Dividend	300	300	300
ACT	162	162	162
Mainstream corporation tax	170	170	234
Relief – surplus ACT	188	188	124
Surplus ACT brought forward	500	312	124
Surplus ACT carried forward	312	124	nil
Total tax payable	332	332	396

If on top of this situation we suppose that the company invests in a capital project in the UK costing £100,000 in year 1 and for the meantime we suppose that this project creates no further income, we obtain the financial situation portrayed in Exhibit 7. It is assumed there that the project attracts a 100% first year allowance. By contrasting the total tax payable row in Exhibits 6 and 7, it can be seen that the cash flow incidence of capital allowances created by the new project accrues on the basis of:

- 17% of capital cost in the year following investment
- 35% of capital cost in the year in which surplus ACT becomes relieved.

EXHIBIT 7

	Year 1	2	3
Figures in £000			
Profit	1,000	1,000	1,000
Capital allowances	100	nil	nil
Corporation tax at 52%	468	520	520
Dividend	300	300	300
ACT	162	162	162
Mainstream corporation tax	153	170	199
Relief – surplus ACT	163	188	159
Surplus ACT brought forward	500	347	159
Surplus ACT carried forward	347	159	nil
Total tax payable	315	332	361

So far we have been concerned with the investment implications where a company has unrelieved ACT and taxable profits. Turning to the income aspect of the equation, assume that on top of the flows shown in Exhibit 6 is built an additional UK profit of £100,000 per annum, although the dividend payable is maintained constant at £300,000. This latter assumption is of essence to the view developed in this paper: Increased dividend means increased ACT and in the situation at which we are now looking,

namely one of unrelieved ACT and available taxable profits, this would mean increased total tax payable whilst surplus ACT remained, since mainstream corporation tax would be at the minimum 17% rate on the taxable profits. The position adopted in the development of the argument in this paper essentially regards the payment of dividend - and hence of ACT - as not being incremental to any single project. The author, whilst wholeheartedly agreeing that the dividend decision is a function of a company's aggregate of capital projects, would defend the above view as being a fair simulation of reality. This can be shown by considering the situation in which a sizeable new project promises, and indeed delivers, a substantial increment to profit - and cash flow - but at the same time the company's existing aggregate of other projects records a fall in profit - and cash flow - such that aggregate profit of the company remains constant resulting in the directors maintaining, not increasing, dividend. Of course, in the UK at the present time, dividend restraint reinforces this view.

Returning to the additional profit of £100,000 per annum on top of the situation in Exhibit 6, this produces the flows indicated in Exhibit 8. By studying the total tax payable row therein compared with the corresponding row in Exhibit 6, it can be seen that the company would pay an additional £17,000 tax in year 1, an additional £17,000 tax in year 2 and an additional £122,000 in year 3. In other words, as suggested in the second paragraph of this paper, the incidence of taxation on additional profit resulting from the project occurs, in cash flow terms, in the following pattern:

- 17% per annum whilst surplus ACT persists
- in the year in which surplus ACT becomes relieved and thereafter, the rate of 52% applies
- furthermore in the year in which surplus ACT becomes relieved, the rate of 35% applies in respect of aggregate increased profits for each of the years during which surplus ACT

persisted.

EXHIBIT 8

	Year	1	2	3
Figures in £000				
Profit		1,100	1,100	1,100
Corporation tax at 52%		572	572	572
Dividend		300	300	300
ACT		162	162	162
Mainstream corporation tax		187	187	356
Relief - surplus ACT		223	223	54
Surplus ACT brought forward		500	277	54
Surplus ACT carried forward		277	54	nil
Total tax payable		349	349	518

No Taxable Profits in the Short Term and Unrelieved ACT

As an example of this type of situation, assume that a UK company with annual profits of £1 million per annum has £2 million of tax losses brought forward, pays a net dividend of £300,000 and also has unrelieved ACT brought forward of £150,000. On the basis of this series of figures, losses brought forward would make taxable profits nil; thus the company would in year 1 have a tax outflow of £162,000 made up of unrelieved advance corporation tax. In the following year the same picture would hold. Thereafter, since losses brought forward would have been exhausted, total tax paid would be the sum of unrelieved ACT of £162,000 and the minimum mainstream corporation tax of £170,000 (i.e. 17% on taxable profits). This would continue until ACT became totally relieved when the annual total tax paid would amount to £520,000 per annum. Exhibit 9 details the position.

If into the scenario implied in Exhibit 9 we add the fact that the company invests, in year 1, in a UK project, an amount of £1 million, all of which qualifies for a 100% first year allowance, the profile of flows changes as indicated in Exhibit 10. The effect of this is that taxable profit remains nil in

EXHIBIT 9

	Year	1	2	3	4	5	6	7
Figures in £000								
Profit		1,000	1,000	1,000	1,000	1,000	1,000	1,000
Tax losses set off		1,000	1,000	nil	nil	nil	nil	nil
Corporation tax at 52%		nil	nil	520	520	520	520	520
Dividend		300	300	300	300	300	300	300
ACT		162	162	162	162	162	162	162
Mainstream corporation tax		nil	nil	170	170	260	368	358
Relief - surplus ACT		nil	nil	188	188	98	nil	nil
Tax losses b/f		2,000	1,000	nil	nil	nil	nil	nil
Tax losses c/f		1,000	nil	nil	nil	nil	nil	nil
Surplus ACT b/f		150	312	474	286	98	nil	nil
Surplus ACT c/f		312	474	286	98	nil	nil	nil
Total Tax payable		162	162	332	332	422	520	520

EXHIBIT 10

	<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
Figures in £000								
Profit		1,000	1,000	1,000	1,000	1,000	1,000	1,000
Tax losses and capital allowances set off		1,000	1,000	1,000	nil	nil	nil	nil
Corporation tax at 52%		nil	nil	nil	520	520	520	520
Dividend		300	300	300	300	300	300	300
ACT		162	162	162	162	162	162	162
Mainstream corporation tax		nil	nil	nil	170	170	170	286
Relief – surplus ACT		nil	nil	nil	188	188	188	72
Tax losses and capital allowances b/f		2,000	2,000	1,000	nil	nil	nil	nil
Tax losses and capital allowances c/f		2,000	1,000	nil	nil	nil	nil	nil
Surplus ACT b/f		150	312	474	636	448	260	72
Surplus ACT c/f		312	474	636	448	260	72	nil
Total tax payable		162	162	162	332	332	332	448

year 3 and ACT does not become relieved until year 7. Contrasting the total tax payable line in the two exhibits indicates that the cash saving totals £520,000 and the spread of this is £170,000 in year 3, £90,000 in year 5, £188,000 in year 6, and £72,000 in year 7. In other words the incidence of tax saving caused by the investment is as follows:

- 17% of capital cost in the first year that the company would, without investment, have started to have taxable profits.
- 35% of capital cost in the year in which surplus ACT would, without the investment, become relieved. But this cannot depress the mainstream liability below the minimum; this may mean that the capital allowance advantage may be deferred to the following year.

Now, if instead of the additional figures in the previous exhibit, all of which resulted from incremental investment, we had built into the assumptions in Exhibit 9 further UK profit – and cash flow – of £100,000 per annum, we would obtain the position detailed in Exhibit 11. The additional profit means that more of the tax losses brought forward are con-

sumed in the first year than in the scenario in Exhibit 9. Similarly, surplus ACT is relieved earlier. However, the main point concerns the marginal rate of tax applied to additional profit. It can be seen, by contrasting the tax payable line in Exhibit 11 with the corresponding line in Exhibit 9, that the incidence of taxation on additional profit is:

- no tax payable until tax losses and capital allowances brought forward are exhausted.
- in the year in which there is a transition from no taxable profits to an unrelieved ACT situation, aggregate incremental profits to date are taxed at 17%
- then 17% per annum on profit whilst surplus ACT persists
- furthermore, in the year that surplus ACT becomes relieved, the rate of 35% applies in respect of aggregate increased profits for each of the years during which surplus ACT persisted
- in the year when surplus ACT becomes relieved and thereafter the effective rate is 52% on taxable profits.

EXHIBIT 11

	<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
Figures in £000								
Profit		1,100	1,100	1,100	1,100	1,100	1,100	1,100
Tax losses and capital allowances set off		1,100	900	nil	nil	nil	nil	nil
Corporation tax at 52%		nil	104	572	572	572	572	572
Dividend		300	300	300	300	300	300	300
ACT		162	162	162	162	162	162	162
Mainstream corporation tax		nil	34	187	229	410	410	410
Relief – surplus ACT		nil	nil	223	181	nil	nil	nil
Tax losses and capital allowances b/f		2,000	900	nil	nil	nil	nil	nil
Tax losses and capital allowances c/f		900	nil	nil	nil	nil	nil	nil
Surplus ACT b/f		150	312	404	181	nil	nil	nil
Surplus ACT c/f		312	404	181	nil	nil	nil	nil
Total tax payable		162	196	349	391	672	672	672

Examples

So far in this article the intentions have been to make clear the way in which the incidence of cash flows resulting from a UK capital investment project can be distorted by surplus ACT. The observations made to date in this paper are now applied to the case of a capital investment project with a ten year life which, under the assumptions of a normal tax position – taxable profits and no surplus ACT – promises a 20% DCF yield. The net present value of this project is calculated with a 20% discount rate and a 10% discount rate under the following assumptions:

- taxable profits and no surplus ACT
- taxable profits and surplus ACT which becomes relieved during year 5
- taxable profits and surplus ACT which remains unrelieved throughout the ten year life of the project; surplus ACT is relieved in year 12.
- no taxable profits until year 4 and surplus ACT which becomes relieved in year 6.

The cash flows which result in these circumstances are shown respectively in Exhibits 12, 13, 14 and 15. It should be noted that the hypothetical investment in the exhibits attracts a 100% first year allowance for capital allowances purposes.

Clearly the four exhibits indicate that the distortion can be significant and ought not to be disregarded. In each of the examples the distortion is such that the net present value is below what it would have been in normal circumstances – that is taxable profits and no unrelieved ACT.

Suitable allowance for the distorting influence should be made in project appraisal by all companies where the tax positions referred to in this paper apply.

Admittedly it is no ‘fault’ of the project that a company is in an unrelieved ACT position; thus some readers might argue that the projected outturn of a potential investment should not therefore be penalised. I would counter by asserting that one of the essentials of investment appraisal is to allow for the way in which tax impinges upon a project. The tax environment is critically relevant to investment appraisal and failure to take account of its full significance represents a failure to allow for one of the key factors in corporate investment policy, since the central objective of the aggregate of a company's investments is the generation of adequate *net of tax cash flows*.

All of the examples set out have been concerned with the hypothetical investment project which attracts a 100% first year allowance but there is only a slight modification necessary for other forms of capital allowance.

Confronted by falling profits, coupled with the corporate desire to avoid a reduction in dividend, more and more companies are moving towards an unrelieved ACT position. This tax position generally results in UK investment projects yielding a lower net present value than would have resulted had the company been operating in an environment of taxable profits and no surplus ACT – Exhibits 12 to 15 reinforce this opinion. Given that the effect is a lowering of projected net present value, the conclusion that an unrelieved ACT position can lower a company's UK investment commitment may follow.

The government is continually exhorting industry to invest more. A return to some form of investment grant system – if accompanied by greater promptness

EXHIBIT 12 Taxable profits and no surplus ACT

Figures in £000

Year	Investment or cash generated	Capital allowances	Tax	Net cash flow	Discounted at	
					20%	10%
0	(1,680)			(1,680)	(1,680)	(1,680)
1	400	874		1,274	1,062	1,158
2	400		(208)	192	133	159
3	400		(208)	192	111	144
4	400		(208)	192	93	131
5	400		(208)	192	77	119
6	400		(208)	192	64	108
7	400		(208)	192	54	99
8	400		(208)	192	45	90
9	400		(208)	192	37	81
10	400		(208)	192	32	74
11			(208)	(208)	(28)	(73)
					nil	410

EXHIBIT 13**Taxable profits and surplus ACT which becomes relieved during year 5**

Figures in £000

Year	Investment or cash generated	Capital allowances	Tax	Net cash flow	Discounted at 20%	Discounted at 10%
0	(1,680)			(1,680)	(1,680)	(1,680)
1	400	286		686	571	624
2	400		(68)	332	230	274
3	400		(68)	332	192	249
4	400		(68)	332	160	227
5	400	588	(628)	360	145	224
6	400		(208)	192	64	108
7	400		(208)	192	54	99
8	400		(208)	192	45	90
9	400		(208)	192	37	81
10	400		(208)	192	32	74
11			(208)	(208)	(28)	(73)
					(178)	297

EXHIBIT 14**Taxable profits and surplus ACT throughout project's life; surplus ACT becomes relieved in year 12**

Figures in £000

Year	Investment or cash generated	Capital allowances	Tax	Net cash flow	Discounted at 20%	Discounted at 10%
0	(1,680)			(1,680)	(1,680)	(1,680)
1	400	286		686	571	624
2	400		(68)	332	230	274
3	400		(68)	332	192	249
4	400		(68)	332	160	227
5	400		(68)	332	133	208
6	400		(68)	332	111	187
7	400		(68)	332	93	170
8	400		(68)	332	77	166
9	400		(68)	332	64	141
10	400		(68)	332	54	128
11			(68)	(68)	(9)	(24)
12		588	(1400)	(812)	(91)	(259)
					(95)	398

EXHIBIT 15**No taxable profits until year 4 and surplus ACT becoming relieved in year 6**

Figures in £000

Year	Investment or cash generated	Capital allowances	Tax	Net cash flow	Discounted at 20%	Discounted at 10%
0	(1,680)			(1,680)	(1,680)	(1,680)
1	400			400	333	364
2	400			400	278	331
3	400			400	231	301
4	400	286	(204)	482	232	329
5	400		(68)	332	133	206
6	400	588	(768)	220	74	124
7	400		(208)	192	54	99
8	400		(208)	192	45	90
9	400		(208)	192	37	81
10	400		(208)	192	32	74
11			(208)	(208)	(28)	(73)
					(269)	246

of payment than was displayed in the sixties - whilst helping companies' cash flow problems, would mitigate some of the problems created by an unrelieved ACT position where the investing company is unable to obtain the immediate full benefit of capital allowances.

Implications for the Cost of Capital

The foregoing has been concerned with the investment side of the equation. On the financing side there are implications for the net of tax cost of debt which flow through to the weighted average cost of capital. For example, if a company's taxable profit *before* deducting interest charges in a year is nil, the tax benefit of interest paid at the present time - which is effectively paid gross in the short term whether it is bank interest or debenture interest since in the latter case the company has to remit the tax credit to the Revenue - is deferred until the company has taxable profits before interest against which to set the interest paid. But even then the full benefit may be deferred because of unrelieved ACT.

In cases where a company is in an unrelieved ACT position, interest paid may only attract relief at the minimum mainstream corporation tax rate of 17% in the short term, the full benefit being deferred.

Consequently in calculating the net of tax cost of debt, cognizance of the company's individual tax position should be borne in mind. Admittedly the company will - assuming it eventually achieves substantial profit status - ultimately obtain the tax benefit associated with debt interest, but the fact that such benefit is deferred increases the net cost of debt.

In a practical context it may be that the necessary adjustment would be so small as to be ignored. But the position should clearly be reviewed by the company.

Conceptual Problems

In studying and applying the above rules, as to the incidence of taxation effects in project appraisal, the reader may well conclude that there are at least two conceptual difficulties.

First of all if a decision rule is based upon the first projects coming up for consideration being treated in the manner suggested until a normal tax position is reached, this may result (for example where a capital rationing situation follows) in sub-optimal project selection. This problem might be surmounted by way of portfolio analysis or via a mathematical programming approach. In the former case deferred tax incidence in respect of early

projects would accrue to the first investments in each set, and selection of the optimal set would follow. In the latter case the affinity to a capital rationing problem is clear and seeking the optimum might involve solution of a linear programming model of the type developed by Weingartner³ (or as refined by Bernhard).⁴ Conceivably the model might even involve project selection on the basis of profitability with constraints as to capital supply and capital allowance available. Similarly use of an integrated model⁴ of investment and financing would overcome the problem. But in each case there are practical problems since management would have to be able to specify both its forward capital expenditure programme fairly carefully over a longish time horizon (certainly until the company moves out of the distorting tax position) together with the pattern of cash flows likely to accrue from those projects. That is not to say that one should not attempt to follow such a procedure. The realities of business may, however, force one back to a sub-optimal decision rule on a first come first served basis.

The second problem revolves around the fact that the tax reliefs relating to projects and their incidence in terms of cash flows are functions of the taxable profit position of the company, together with its unrelieved ACT position, and the total capital expenditure and profits of *such projects themselves*. Thus the greater the number of profitable projects, the earlier one moves away from a tax position where relief in cash flow terms is at less than 52%.

In practice it is consequently necessary for the planning and taxation departments of a company to come up with estimates - and these should be regularly brought up-to-date as new information about profit expectations, capital spending plans, dividend plans and taxation legislation become available - of the timing of transition from a 'no taxable profits' status, to an 'unrelieved ACT' status, thence to a 'full taxable profits' status. Again such a procedure presupposes management's ability to make estimates of its forward capital programme and future profit outturns.

³H. Martin Weingartner, 'Mathematical Programming and the Analysis of Capital Budgeting Problems', Prentice-Hall, 1963.

⁴Richard H. Bernhard, 'Mathematical Programming Models for Capital Budgeting - a Survey, Generalisation and Critique', *Journal of Financial and Quantitative Analysis*, Vol. 4, June 1969.

⁵See, for example, D. J. Chambers, 'The Joint Problem of Investment and Financing', *Operational Research Quarterly*, 22, 3 (1971).

Conclusion

Obviously from the standpoint of the company dealing with this project appraisal problem in a practical context, the first step is to identify and forecast the company's tax status. This is a function of past results and policy, and assumptions and projections in the company's corporate plan or long range financial forecast. Dealing with this problem ought to involve planning and taxation experts. Having gone through the process of establishing the exact tax status, the setting down of rules relevant to cash flow projection in capital analysis should follow in accordance with the guidelines set out in this paper. The question of whether an optimal or a sub-optimal solution is sought is deliberately left open by the author, whose opinion is that few companies possess the depth of dynamic data base necessary to provide the optimum.

Certainly project appraisal which involves taxation incidence at the full corporation tax rate when the company is in one of the positions referred to in this paper is incorrect, should be recognised as such and not followed in practice. In these circumstances, all projects of a capital budgeting nature, whether they involve straight investment, acquisition of another company, a lease or buy decision, etc. ought to have built into the analysis cash flow incidence as outlined here.

Postscript

In connection with the frequency with which unrelieved advance corporation tax is encountered in practice, it is interesting to note that according to financial analysis undertaken by stockbrokers Phillips and Drew, over two-fifths of the major companies analysed by them are now paying no mainstream corporation tax - in other words they are paying ACT only. Given this very high proportion, the relevance of the article to a broad spectrum of companies is clear. Furthermore it should be noted that the imputation tax is failing to achieve one of the key objectives intended by its architects, namely that profits are given equal value whether retained by the company or distributed to shareholders who pay the standard rate of income tax. With unrelieved ACT, the system clearly discriminates against dividend distribution. And the number of companies so affected is indeed significant.

Acknowledgement

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Manipulation of Earnings Figures in the United Kingdom

R. C. Morris and G. H. Breakwell

Introduction

The possible manipulation¹ of profit figures by managers has for some years absorbed the interest of a growing number of American academics, yet surprisingly little appears to have been written on the subject on this side of the Atlantic.

The rationale behind such 'creative' accounting was originally developed by Hepworth in 1953,² who saw it as both a means of maintaining the confidence of owners and creditors; and of ensuring the continuity of satisfactory industrial relations. The importance of maintaining confidence by permitting companies to indulge in 'cosmetic reporting' has even been recognised by national governments. Thus in Sweden manipulation of profit figures has been deliberately encouraged to dampen cyclical fluctuations,³ while several other European countries tolerate the use of 'secret reserve' accounting. However, over the years academic attention seems to have been increasingly concentrated on the effects of possibly manipulative procedures on share prices.

There are various ways in which accounting figures can be doctored, but the usual objective behind such manipulation is to improve solvency and profit indicators. As regards the latter, there are basically two different approaches – income smoothing; and profit improvement – though frequently it is difficult to distinguish between them.

¹Throughout this article the phrase 'manipulation of earnings' is used merely to imply the skilful management of accounting techniques to produce a particular profit figure. (In fact, it has been used in a similar sense in several American studies on the topic.) It should be noted that no imputation of dishonesty or impropriety is intended.

²S. R. Hepworth, 'Periodic income smoothing', *Accounting Review*, 1953.

³S-E. Johansson, 'An appraisal of the Swedish system of investment reserves', *International Journal of Accounting*, Fall, 1965. However, it is usual nowadays to show the effects of such reserve accounting in notes to the financial statements; and, anyway, the current values of fixed assets are disclosed in the directors' report.

Income Smoothing

Income smoothing implies that managers have a long-term strategy to report a non-volatile pattern of earnings. This is likely to lead them *ex ante* to adopt policy decisions and/or a set of acceptable accounting conventions which will produce the required trend in profit figures.⁴ It is not difficult to pursue the latter tactic, in fact, since there is a near-infinite number of combinations of such conventions.⁵ The more obvious practices which might be relevant include deferred charge accounting for taxation, R and D, and even advertising; such treatments could yield a smoother pattern of reported earnings than if the items were expensed immediately.

It should be pointed out, of course, that there may be some justification in pursuing such policies. Frequently the financial community appears to regard the trend in profits from year to year as reflecting the relative performance of a business. However, such a view can really only be sustained where the method of income measurement used fully adjusts *ex ante* for the arbitrary incidence of expected cash receipts and payments. In fact, the only income concept which would really seem to meet these conditions is Hicks's second version – consumption maintenance – where the calculation deliberately gives a completely smoothed *ex ante* profit stream.⁶ Unfortunately the *ex ante* versions of the conventional accounting income concept normally used (and its near surrogates, such as the rate of return) do not achieve a similar result, even though empirical research has clearly demonstrated a natural tendency

⁴See N. J. Gonedes, 'Income-smoothing behaviour under selected stochastic processes', *Journal of Business*, 1972, for a recent discussion of the topic and a review of the empirical evidence.

⁵R. J. Chambers, 'A matter of principle', *Accounting Review*, 1966.

⁶See R. H. Parker and G. C. Harcourt (eds.), 'Readings in the Concept and Measurement of Income', the University Press: Cambridge, 1969: pp. 74-82 and pp. 161-182.

to smooth through mean reversion.⁷ Consequently, observed fluctuations in profit figures may very well not necessarily reflect variations in underlying economic performance. Nevertheless, so long as trends in reported income figures are widely regarded as an index of efficiency, it would hardly be surprising if managers argued that they are justified in adopting accounting policies which in *ex ante* terms would produce the smoothest pattern of income over time.

In practice, of course, outcomes rarely fulfil expectations, with the result that even Hicks's consumption maintenance income concept in *ex post* terms would usually produce different profit figures for different periods. Nevertheless, the fact that the conventional accounting income concepts would not yield a constant *ex ante* figure may understandably be regarded by some managers as justification for making *ex post* adjustments to produce a smoother profit record. In many cases the manipulation will produce 'profit improvement', though where a smoothing strategy is being pursued firms will equally strive to lower earnings in good years, shifting any 'excess' forwards for subsequent recognition in lean times.

Risk and Profit Smoothing

If one regards Hicks's second approximation to income (where *ex ante* profit is constant per period) as being that which is possibly most generally used by the financial community when assessing performance, it is not unreasonable to regard the volatility of *ex post* earnings as an index of risk. The fluctuations, of course, provide some measure of the difference between expected and actual outcomes.

This property has commended itself to a number of researchers in recent years who have set out to establish relative risk patterns for industries and firms.⁸ Unfortunately, though, they have had to use accounting income data in their studies, which may well have invalidated their results. Whereas Hicks's second income concept would *ex ante* smooth out all *expected* fluctuations in sales and expenditures to produce equal profits in each sub-period, the same cannot be guaranteed with accounting concepts. As has already been mentioned, reported *ex post* profits will normally partly reflect the volatility of cash flows *even if* such fluctuations were foreseen and the results are exactly as expected. Thus the researchers concerned have hardly exclusively measured risk, but instead have to some extent studied the cyclical nature of trade in various industries – and even this may have been partly hidden, depending on the extent of natural mean reversion present and the

ACCOUNTING AND BUSINESS RESEARCH

degree of success enjoyed by managers indulging in smoothing strategies and *ex post* profit manipulation.

Nevertheless, while it should be recognised that the volatility of reported profits may be a poor measure of intrinsic business risk, such information may still be valuable. Thus, for instance, it is an established fact that share prices reflect such fluctuations, and it is therefore important for investors to have some measure of covariability in price movements between securities held in a portfolio.⁹ In other words, the market acts as though the degree of volatility in a firm's earnings is a good measure of the business risks to which it is subject, and as a result the pattern of fluctuations is an important consideration to an investor trying to assess the risks inherent in owning a particular share. Consequently, so long as the market reveals a 'functional fixation' with the accounting figures, it may well be in the interests of managers to ensure their company reports a smoothish pattern of profits.

Profit Improvement

Profit improvement suggests a short-term strategy on the part of managers who in 'bad' years merely seek to increase reported earnings. Such manoeuvres may well often reduce future profits, but this does not necessarily imply a long-term smoothing policy. For example, a firm which is doing badly might well choose to report as much profit as possible in the short-term, the rationale being that if the situation

⁷See W. H. Beaver, 'The time behaviour of earnings', *Journal of Accounting Research*, 1970: Supplement on Empirical Research in Accounting: Selected Studies. The same evidence can be seen from tables given by G. R. Conrad and E. H. Plotkin two years earlier: 'Risk/return: US industry pattern', *Harvard Business Review*, 1968.

⁸e.g. G. J. Stigler, 'Capital and Rates of Return in Manufacturing Industries': National Bureau of Economic Research, Princeton University Press: Princeton, N.J., 1963; Conrad and Plotkin, op. cit.; I. N. Fisher and G. R. Hall, 'Risk and corporate rates of return', *Quarterly Journal of Economics*, 1969; and C. R. Tomkins, 'Business risk in UK industries and companies: a non-parametric approach': paper presented at the AUTA national conference at the University of Manchester: April 13, 1972. These three writers all used a rate of return profit indicator; three others have tested the variability of earnings: R. F. Wipperf, 'A note on the equivalent risk class assumption', *The Engineering Economist*, Spring 1966; N. J. Gonedes, 'A test of the equivalent risk class hypothesis', *Journal of Financial and Quantitative Analysis*, June 1969; and R. A. Fawthrop, 'The "equivalent risk class" concept, industrial classifications, and the cost of capital', *AUTA News Review*, Autumn 1972.

⁹R. Ball and P. Brown, 'Portfolio theory and accounting', *Journal of Accounting Research*, 1969; W. H. Beaver, P. Kettler, and M. Scholes, 'The association between market determined and accounting determined risk measures', *Accounting Review*, 1970; and B. Lev and S. Kunitzky, 'On the association between smoothing measures and the risk of common stocks', *Accounting Review*, 1974.

doesn't improve disaster will come anyway, but at least the evil day of reckoning will have been postponed. (An obvious instance might arise where a firm chooses to capitalise R and D rather than expense it.)

Methods of Manipulating Reported Profits

In practice there are three main ways in which managers can affect the levels of profit they report.

(1) *Discretionary expenditure.* Managers can clearly arrange their business decisions to ensure a smoothish pattern of earnings, and such manipulation is sometimes referred to as 'real smoothing'.¹⁰ Particularly important in the short-term is the control exercised over the timing of certain fringe spending on items such as social welfare projects and marginal R and D programmes. Obviously, where the costs are usually expensed immediately, the shelving of such projects in a 'bad' year will help improve reported profits. Other examples of this type of manipulation (which may also be particularly helpful in window-dressing balance sheet ratios) are the timing of work certification and interim payments agreed in long-term contracts; and the regulation of the speed at which invoices are issued.

(2) *Changes in accounting conventions.* A switch from one method of valuing inventories or intangibles to another; or a change in the treatment of depreciation or deferred charges, can frequently significantly alter a reported profit figure.

Sometimes where an adjustment is made on reserves a switch of this nature means either that some part of profit (or, less usually, loss) is reported twice; or, alternatively, that an expense or revenue is never taken into account. In such cases the decision to change is largely neutral as regards the amount of profit or loss that will be reported in the future.

On other occasions the change in accounting basis merely involves a change in the *timing* of revenue or expense recognition, in which case there is usually a commitment which will affect the level of future reported profits in a particular way.

An example of the former type of manipulation could be a change in the basis of stock valuation; while a switch from the 'flow-through' to the 'deferred charge' method of dealing with taxation is an instance of the latter. It should be observed, incidentally, that while the effects of changes of the first type (where material) usually have to be disclosed in company accounts, switches of the second

type do not always have to be revealed. Thus a company can legitimately treat expenditure on two successive advertising campaigns in different ways, and similarly it has room to manoeuvre with R and D on different research projects; and in classifying new assets in different (depreciation) categories from those they replace.

(3) *Changes in income definitions.* In certain instances managers enjoy discretion in the exact way in which they report particular items. Thus in the past it has been possible to treat a 'profit' on the sale of a fixed asset in at least three ways: firstly, as a capital item credited direct to reserves; secondly, as an extraordinary item, credited to the income account after the operating profit has been struck; or, thirdly, as an adjustment to the depreciation figure charged in calculating the operating profit. Until recently consistency in this field has not been strictly necessary. However, the choice exercised in respect of material *individual* items can in fact normally be discovered by closely scrutinising the accounts, and the Accounting Standards Steering Committee's recent standards requiring specification of accounting policies and a prescribed treatment for extraordinary items have helped improve disclosure and narrow choice in this particular area.¹¹

Empirical Evidence of Manipulation

A The United States and Canada

Empirical studies to try and establish whether possible income manipulation is an important feature in North American corporate reporting really date from 1966. Evidence comes from three types of study.

(i) *Anecdotal.* Over the years many instances have been recorded of firms either choosing one accounting convention rather than another or changing their basis of accounting. Unfortunately, they have rarely been documented, Schiff's study being exceptional in this respect.¹² Celebrated examples in recent years include Chrysler's decision to abandon the LIFO method of stock valuation, even though it meant the corporation incurred a heavy bill for back-payment of taxes;¹³ and the different treatments accorded to revenues from the sale of shares in the

¹⁰See Lev and Kunitsky, op. cit., for a full discussion of this type of smoothing and a study of its incidence in the United States.

¹¹The Institute of Chartered Accountants in England and Wales: 'Disclosure of accounting policies', Statement of Standard Accounting Practice 2, 1971; and 'Extraordinary items and prior-year adjustments', Statement of Standard Accounting Practice 6, 1974.

¹²M. Schiff, 'Accounting tactics and the theory of the firm', *Journal of Accounting Research*, 1966.

¹³Wall Street Journal, 9th February 1971; A. J. Briloff, 'Unaccountable Accounting', Harper and Row, New York: 1972, pp. 36-39.

Ethyl Corporation by its former joint owners, General Motors and Standard Oil (New Jersey).¹⁴

(2) *Smoothed/unsmoothed comparisons.* In this kind of study tests are conducted to see whether or not the inclusion of a supposedly manipulated variable produces a smoother stream of income.

(3) *Correlation tests between changes in accounting practices and company performance.* Various studies of this type have been conducted applying several different testing models to data to see whether companies with declining earnings are more prone to improved reported profits; or, where their incomes are increasing, more likely to reduce them.

The results of the earlier studies (summarised by Copeland)¹⁵ were inconclusive, probably largely for methodological reasons. Attention tended to be concentrated on the treatment of one particular accounting item rather than a view being taken of a company's overall policies; and in some instances the definition of an acceptable smoothing device seems to have been unnecessarily restrictive. Too often the studies have examined the behaviour of large and

¹⁴T. F. Keller and S. A. Zeff, 'Financial Accounting Theory II', McGraw-Hill: New York, 1969: pp. 5-18; Forbes, May 15, 1967. Many other instances are described by Briloff, op. cit.

¹⁵R. M. Copeland, 'Income smoothing', *Journal of Accounting Research*, 1968; Supplement on Empirical Research in Accounting: Selected Studies.

¹⁶This is an obvious point, though one which is rarely made in the literature: but see R. K. Jaedicke and R. T. Sprouse, 'Accounting Flows, Income, Funds and Cash', Prentice-Hall: Englewood Cliffs, N. J., 1965: p. 75.

¹⁷e.g. B. Lev, 'Industry averages as targets for financial ratios', *Journal of Accounting Research*, 1969; W. H. Beaver, op. cit.; R. M. Copeland and J. F. Wojdak, 'Income manipulation and the purchase-pooling choice', *Journal of Accounting Research*, 1969; R. M. Simpson, 'An empirical study of possible income manipulation', *Accounting Review*, 1969; P. E. Dascher and R. E. Malcom, 'A note on smoothing in the chemical industry', *Journal of Accounting Research*, 1970; G. E. White, 'Discretionary accounting decisions and income normalisations', *Journal of Accounting Research*, 1970; and 'Effects of discretionary accounting policy on variable and declining performance trends', *Journal of Accounting Research*, 1972; R. M. Barefield and E. E. Comiskey, 'Depreciation policy and the behaviour of corporate profits', *Journal of Accounting Research*, 1971; R. Lindhe, 'Accelerated depreciation for income tax purposes - a study of the decision and some firms who made it', *Journal of Accounting Research*, 1963; J. H. Myers, 'Depreciation manipulation for fun and profits', *Financial Analysts Journal*, Nov. - Dec. 1967; and 'Depreciation manipulation for fun and profit', *Financial Analysts Journal*, Sept. - Oct. 1969; R. S. Woods, 'Theory and practice in the capitalization of selling costs', *Accounting Review*, 1959; E. Blaine, 'Reported accounting changes and financial statement manipulation: an empirical study', Proceedings of the Canadian branch of the AAA, 1970; T. R. Archibald, 'The return to straight-line depreciation: an analysis of a change in accounting method', *Journal of Accounting Research*, 1967; Supplement on Empirical Research in Accounting: Selected Studies; J. M. Gagnon,

ACCOUNTING AND BUSINESS RESEARCH

medium sized companies when these will probably, through a natural averaging process, have less need to manipulate than smaller quoted concerns.¹⁸

Subsequent studies¹⁹ seem to have been rather more positive in their conclusions, suggesting discernible manipulation might occur in practice to improve profits in otherwise 'bad' years. However, it appears that such activities are not as widespread as might be imagined; and that although changes in convention are more likely to increase than decrease income, the majority of such changes have a negligible effect. There is evidence of smoothing too, though manipulation of accounting reporting practices is probably not widely used as a means of achieving this goal.

These findings are not altogether surprising, of course, since other research has established that the market tends to adjust rapidly for discernible manipulative procedures - probably because professional analysts in North America as in the UK automatically 'unscramble' the figures presented in annual reports to put them on a 'comparable' basis.¹⁸

'The purchase-pooling choice: some empirical evidence', *Journal of Accounting Research*, 1971; F. Neumann, 'The incidence and nature of consistency exceptions', *Accounting Review*, 1969; F. A. Bird, 'Interperiod comparability in financial reporting', *Journal of Accountancy*, 1969; L. E. Jacobsen, 'The rise of the profit deferral notion', *Accounting Review*, 1963; N. Dopuch and R. Watts, 'Using time-series models to assess the significance of accounting changes', *Journal of Accounting Research*, 1972; and B. E. Cushing, 'An empirical study of changes in accounting policy', *Journal of Accounting Research*, 1969.

¹⁸The strongest and most recent findings on the ability of the market to adjust are given by R. Ball, 'Risk, return and disequilibrium: an application to changes in accounting techniques', *Journal of Finance*, 1972; and 'Changes in accounting techniques and stock prices', *Journal of Accounting Research*, 1972; Supplement on Empirical Research in Accounting: Selected Studies. Earlier studies on this and related points include J. L. O'Donnell, 'Relationships between reported earnings and stock prices in the electric utility industry', *Accounting Review*, 1965; and 'Further observations on reported earnings and stock prices', *Accounting Review*, 1968; N. J. Gonedes, 'The significance of selected accounting procedures: a statistical test', *Journal of Accounting Research*, 1969; Supplement on Empirical Research in Accounting: Selected Studies; F. A. Mlynarczyk, Jr., 'An empirical study of accounting methods and stock prices', *Journal of Accounting Research*, 1969; Supplement on Empirical Research in Accounting: Selected Studies; E. E. Comiskey, 'Market response to changes in depreciation accounting', *Accounting Review*, 1971; T. R. Archibald, 'Stock Market reaction to the depreciation switch-back', *Accounting Review*, 1972; E. F. Baskin, 'The communicative effectiveness of consistency exceptions', *Accounting Review*, 1972; W. H. Beaver and R. E. Dukes, 'Interperiod tax allocation, earnings expectations, and the behaviour of security prices', *Accounting Review*, 1972; R. S. Kaplan and R. Roll, 'Investor evaluation of accounting information: some empirical evidence', *Journal of Business*, 1972; and D. H. Patz and J. R. Boatman, 'Accounting principle formulation in an efficient market environment', *Journal of Accounting Research*, 1972.

Moreover, any manager who really wishes to window-dress his company's figures would hardly choose a method which requires him to publicise his manipulative procedures!

B The United Kingdom

Little work appears to have been specifically undertaken in the UK to examine the importance of smoothing and manipulative procedures in corporate reporting. However, a good deal of circumstantial evidence has been accumulated from various sources; and moreover, one of the main *raisons d'être* behind the creation of the Accounting Standards Steering Committee seems to have been to try and prevent deliberate manipulation of profits by management.

(1) *Anecdotal.* It is quite clear that in the 1930s and 1940s a number of British companies deliberately created secret reserves and manipulated their accounting figures so as to produce profit levels acceptable to management. The best known instance is obviously the Royal Mail case, which is a blatant example of manipulative smoothing, but there are also other well documented instances in the same period.¹⁹ Such procedures were, of course, regarded as perfectly right and proper at the time by the accountancy profession²⁰ and had previously been endorsed by the courts where shareholders did not demand more meaningful accounts of their directors and auditors.²¹

More recently, quite apart from companies revaluing assets when it suits them to impress shareholders, there have been a number of cases where perfectly acceptable though somewhat unusual procedures have been adopted to deal with particular transactions. Frequently these have concerned the transfer of 'exceptional' losses direct to reserves (e.g. Cunard, the Thomson Organisation)²² and the capitalisation of R and D (Rolls Royce).²³ These are far from being isolated incidents, and most professional accountants have observed cases where manipulation has possibly been attempted. A

¹⁹H. Ross, 'Financial Statements: a Crusade for Current Values', Pitman: Toronto, 1969: pp. 23-25.

²⁰See, for instance, Sir Patrick Hastings, 'The case of the Royal Mail', in W. T. Baxter and S. Davidson (eds.), 'Studies in Accounting Theory', Sweet and Maxwell: London, 1962.

²¹*Newton v. Birmingham Small Arms Co. Ltd.* [1906] 2 ch. 378; and *Young v. Brownlee and Co. Ltd.* [1911] S.C. 677; but see also *In re Spanish Prospecting Co. Ltd.* [1911] 1 ch. 92, for the distinction drawn by the courts where third party rights are involved - confirmed in *Edwards v. Saunton Hotel Co. Ltd.* [1943] 1 All ER 176.

²²E. Stamp and C. Marley, 'Accounting Principles and the City Code', Butterworths: London, 1970: pp. 117-118.

²³'When is a profit not a profit?', Robert Heller, *The Observer*, November 16th, 1969: p. 14.

particularly well documented example is Wright-Hamer textiles, whose profit figures were effectively increased without incurring the auditor's qualification by changing the accounting date.²⁴

There appear to be relatively few instances of companies publishing supplementary series of profit figures to present a fairer picture of the trend in earnings - though retrospective adjustments of this type are required when preparing a prospectus, of course. However, in an exceptional example, the chairman of Unigate very sensibly gives an (unaudited) table of smoothed profit figures, adjusted with hindsight to allow for the true incidence of milk margins.²⁵

(2) *Smoothed/unsmoothed comparisons.* Although no direct comparisons have been made using British data, it is possible to reach certain broad conclusions by examining the results of various economic studies undertaken in recent years. Thus while Rayner and Little discovered that earnings per share movements were stochastic,²⁶ four other studies using rate of return data have disclosed an underlying mean reverting pattern.²⁷ These results are very similar to those reached in corresponding studies undertaken using US data,²⁸ and the rate of return studies at least seem to lend support to Beaver's conclusion that accounting indicators are inherently smoothing in nature.

(3) *Correlation tests between changes in accounting practices and company performance.* This type of study provides the only real way of establishing the extent of discernible profit manipulation, yet surprisingly the only attempted research along these lines so far undertaken in this country appears to have been by Dev and Webb,²⁹ in their examination of the accuracy

²⁴Board of Trade, 'Investigation into the Affairs of Wright-Hamer Textiles Ltd.': report of the inspectors (N. J. Skelhorn and Sir William Carrington), 5th February, 1960: HMSO, London: paras. 42-44.

²⁵Annual Report of Unigate, 1973: p. 4.

²⁶A. C. Rayner and I. M. D. Little, 'Higgledy Piggledy Growth Again', Basil Blackwell: Oxford, 1966.

²⁷P. E. Hart, 'Studies in Profit, Business Saving and Investment in the UK, 1920-1962', Vol. II, Geo. Allen and Unwin: London, 1968: ch. 18; and 'Competition and rate of return on capital in UK industry', *Business Ratios*, Spring 1968; A. Singh and G. Whittington, 'Growth, Profitability and Valuation', the University Press: Cambridge, 1968; and G. Whittington, 'The Prediction of Profitability', the University Press: Cambridge, 1971.

²⁸e.g. R. Ball and R. Watts, 'Some time series properties of accounting income', *Journal of Finance*, 1972, on earnings per share movements; and Stigler, op. cit.; Y. Brozen, 'The anti-trust task force recommendation for deconcentration', *Journal of Law and Economics*, 1970; Lev, op. cit.; and Beaver, op. cit., on the variability patterns over time of rates of return.

²⁹S. Dev and M. Webb, 'The accuracy of company profit forecasts', *Journal of Business Finance*, 1972.

of prospectus profit forecasts.

In a bid to remedy the situation a brief examination of British data was therefore undertaken. The results, though decidedly weak, tend to bear out the American experience. In short, it appears that very few companies openly manipulate profits, but where firms suffering 'bad' years change their accounting practices they are more likely to increase income than decrease it. However, though the impact of some of these changes was sizeable, for the most part the effects on reported profits were immaterial. No evidence was found to support the long-term smoothing hypothesis, which implies that if firms have such a long-term strategy the number which actually manipulate accounting practices to achieve this goal must be very small indeed.³⁰

The Empirical Test on British Data

A Source of data

The sample covered comprised the 300 industrial and commercial companies used for the English Institute's *Survey of Published Accounts, 1970-71*.³¹ The basis of this population is really the 300 companies chosen for the Institute's 1968-69 Survey, as adjusted over the next two editions. The original 300 firms, in fact, comprised 74 of the first one hundred in the 1968-69 edition of 'the Times 500 largest industrial companies', plus a random selection from the remaining 400.³² Thus, although only 13 per cent of the number of industrial and commercial companies at the time quoted on the London Stock Exchange are covered by the survey, they represent no less than 75 per cent of the equity market capitalisation of the relevant categories. Clearly there is a strong bias in the population towards the largest quoted companies, and this is somewhat unfortunate since – as has already been mentioned – these large firms may have less need to

³⁰Companies with such policies do exist in Britain though. Quite apart from the Unigate example referred to above, one of the writers is aware of a small quoted company which arranged its affairs in such a way that the profits it reported showed a smooth trend. This was made possible by the inadequacy of conventional accounting descriptions, and as a result the manipulation would not have been apparent to an outsider.

³¹Institute of Chartered Accountants in England and Wales, 'Survey of Published Accounts 1970-1971': London, 1972. This year was chosen as the most recent before the overall picture became distorted as a result of companies switching to the equity method of accounting for associates. This change was, of course, officially sanctioned by the Accounting Standards Steering Committee and in most cases tended to improve profits.

³²See the Institute of Chartered Accountants in England and Wales, 'Survey of Published Accounts, 1968-1969': London, 1970; and 'Survey of Published Accounts, 1970-1971': London, 1972, for a further description of the sample; and p. 172 in the latter for an industry analysis of the firms covered in the survey.

ACCOUNTING AND BUSINESS RESEARCH avail themselves of manipulative procedures than smaller quoted ones.

B Approach

The basic approach adopted was to try and determine whether there is a significantly different pattern of behaviour in regard to changes in accounting policies³³ as between firms reporting declining profits and their counterparts reporting rising earnings trends. If it could be shown that firms with declining income figures are more likely to use changes in both accounting conventions and income definitions to improve reported profit figures, then there is a suggestion that some companies indulge in 'profit improvement' policies. Similarly, if it could be demonstrated that the opposite is true – viz. that firms with increasing profit figures are more likely to use changes in accounting policies to reduce earnings than companies already reporting downward trends – then there is some evidence to support the manipulative smoothing hypothesis. A further examination of the data might also reveal whether or not the proportionate effects on reported profits of changes in policies is consistent with the profit improvement and smoothing hypotheses.

C The indicators

For the purpose of the study 'profit' (π) is taken to be 'Group profit after tax and share of minority interests, but before extraordinary items', or its equivalent. It can thus be seen that a transfer from reserves to the extraordinary items account or vice versa will not affect the definition.

A second profit measure (π'') was developed to measure the effect of possible manipulation on the accounting rate of return. This is defined as π' , divided by end year equity capital and reserves expressed as a percentage.

Throughout the paper the symbols π' and π'' represent actual figures reported; symbols with tildes above them indicate figures adjusted to remove the effect on profits of changes in accounting conventions or income definitions. Subscripts are used to refer to time t and $t-1$.

Altogether 55 companies changed their accounting conventions or income definitions in the period under review, three reporting two changes. The most common switches were in depreciation (15), deferred tax (9), stock valuation (3), development expenditure (3), provision for deferred liabilities (3), goodwill amortisation (2), and revaluation of fixed assets (2). The changes appeared to be evenly spread across industry categories in proportion to the firms covered in the survey.

³³The phrase 'change in accounting policies' will hereafter be used collectively to mean changes in both accounting conventions and income definitions.

D The results

Answers were sought to the six questions listed below, appropriate null hypotheses being developed to test the data. The answers given indicate the inference of the tests at the 95 per cent significance level, the nature of the tests and the tables from which the data were taken being indicated in brackets.

(1) Do firms with declining profits behave in a significantly different way in changing accounting policies from those with rising earnings trends?

No: (χ^2 test for two independent samples; Table 1).

(2) Is the proportion of firms changing accounting policies significantly greater for those with declining profits than for those with increasing profits?

No: 18.75 per cent of firms with falling profits made changes, compared to 18.07 per cent of those with rising profits (Table 1).

(3) Where companies have falling profits and they change policies, do they generally do this so as to improve profits?

Some firms probably do, but the general proposition is not proven. (The trend is fairly clear from Table 1, but applying the Fisher exact probability test it is not quite possible to reject a null hypothesis that such changes occur by chance.)

(4) Where companies have rising profits and they change policies, do they generally do this so as to reduce profits?

No: (χ^2 test on null hypothesis that such changes occur by chance; Table 1).

(5) Where firms with declining earnings make changes, is there any tendency that where effects are 'sizeable'³⁴ they generally increase reported profits?

Quite possibly, but the evidence is not strong enough to prove the general proposition. (The trend is fairly clear from Table 2, but applying the Fisher exact probability test it is not possible to reject a null hypothesis that the variation in the two tails of the distribution occurred by chance.)

(6) Where firms with increasing earnings make changes, is there a tendency that where the effects are 'sizeable' they generally decrease reported profits?

No, rather as with firms with falling profits there appears to be a bias when the effects are 'sizeable' towards *improving* reported earnings. (The trend is again clear from Table 2, but it should be noted that it is just conceivable the bias occurred by chance – applying the Fisher exact probability test it is again not possible to reject a null hypothesis that the variation in the two tails of the distribution occurred by chance.)

³⁴'Sizeable' effects are arbitrarily defined as an increase/decrease of over 5% in profits; or of over 2 percentage points in the reported rate of return.

The results from this somewhat simplistic study thus seem to suggest that probably only a very small minority of British firms with declining earnings window-dress their figures by changing accounting policies. Certainly the evidence examined in relation to questions 3 and 5 when taken together seems to point in this direction, implying that a few of the 18 companies with declining absolute profits may have tried to use changes in accounting policies to improve their reported performance.

No evidence was found that firms use changes in accounting policies as part of a long-term strategy to smooth the trend of their earnings.

Summary

In the past ten years a considerable amount of research has been undertaken in the United States studying the extent to which profit figures might be manipulated by changing accounting conventions and income definitions. The results suggest that to some extent this type of manipulation does indeed occur, mainly to improve the earnings figures of firms suffering a decline in profits. However, where such manoeuvres are discernible the market appears to make appropriate adjustments to share prices, and the longer term strategy of income smoothing is achieved largely by other means.

Manipulation of accounting profit figures was widely believed to be a prominent feature in Britain in the 1930s, and more recent anecdotal evidence has implied that some companies at least may still doctor their reported earnings figures. However, Dev and Webb³⁵ concluded there was little overt manipulation by the quoted companies they studied – and this opinion is interesting since the concerns were for the most part relatively small in size and had a clear incentive to report profits close to those forecast. On the other hand, they did notice a significantly asymmetrical distribution in the ratios of 'actual' to 'forecast' profits, implying possibly that manipulation may have occurred though it would have been difficult to detect from information published in the accounts. Indeed, it is instructive to recall their observation that the skewness of the distribution was 'consistent with a hypothesis that reported profits are frequently adjusted upwards if otherwise they would fall below forecast, but rarely downwards if the forecast is exceeded'. Such a conclusion is not inconsistent with the findings in the current study – viz. there is no evidence at all of widespread doctoring of earnings figures, though this does not rule out the possibility that a very small minority may have resorted to such tactics to boost their results when profits were falling.

³⁵Dev and Webb, op. cit., p. 33.

TABLE 1
Directional effects of changes in accounting policies in relation to underlying profit trends

	Profit indicators					
	Π'			Π''		
	Declining trend $\tilde{\Pi}'_t < \Pi'_{t-1}$		Increasing trend $\tilde{\Pi}'_t > \Pi'_{t-1}$		Declining trend $\tilde{\Pi}''_t < \Pi''_{t-1}$	
	No. of cos.	%	No. of cos.	%	No. of cos.	%
Changes ($\Pi'_t - \tilde{\Pi}'_t$)					Changes ($\Pi''_t - \tilde{\Pi}''_t$)	
Increase	12	11.9	20	8.5	Increase	18
Decrease	6	5.9	17	10.1	Decrease	6
No changes	83	82.2	162	81.4	No changes	104
	101	100.0	199	100.0		128
						100.0
						172
						100.0

TABLE 2
Size effects on profit indicators resulting from changes in accounting policies

	Profit indicators					
	Π'			Π''		
	Declining trend $\tilde{\Pi}'_t < \Pi'_{t-1}$		Increasing trend $\tilde{\Pi}'_t > \Pi'_{t-1}$		Declining trend $\tilde{\Pi}''_t < \Pi''_{t-1}$	
	No. of policy changes	%	No. of policy changes	%	No. of policy changes	%
$\frac{\% \text{ effect on original profits}}{\Pi'_t - \tilde{\Pi}'_t} \times 100$					Effect on original rates of return $\Pi''_t - \tilde{\Pi}''_t$	
$\tilde{\Pi}'_t$						
> - 5%	4	20.0	5	13.2	-2 to -6	3.9
- 5% to + 5%	6	30.0	23	80.5	-2 to +2	76.9
> + 5%	10	60.0	10	26.3	+2 to +6	19.2
	20	100.0	38	100.0		26
						100.0
						32
						100.0

A Critique of Historical Record Accounting

Ian Tilley

Like the other professions, accounting is an essential practical activity. Most accountants are engaged in the collecting and presenting of information about economic events to assist a wide range of decision makers. Rules, procedures and techniques must play an important role in the life of the practising accountant. Is there, however, an adequate theoretical basis for these rules and procedures which underlie accounting reports?

Accountants historically have not been preoccupied with the theoretical underpinnings of their discipline. Although there is a growing consciousness of the importance of accounting theory, it is really only the product of the last few decades and this awareness has yet to fully translate itself from studies in the theoretical arena into really meaningful action affecting accounting practice.¹ The rules and procedures of accounting grew up over hundreds of years largely in response to concrete problems encountered by the practising accountant. The result of this *ad hoc* theory was that no explicit theory was either added to or relied upon when rules were formulated. Time and usage gave legitimacy or general acceptance to the practitioners' rules. The classic attempt to construct a theoretical explanation of the multitude of rules used by accountants can fairly be attributed to such writers as Paton and Littleton.² The central thrust of their work, and of the similar studies of the 1940-50 period, was to provide an explanation and codification of accounting practice. They were concerned with justifying, with rationalising, with defending, what accountants actually did in their practical activities. To the extent that we see these efforts as creating a theory of accounting we must sharply differentiate them from the major

theoretical work begun by academic accountants in the 1960s. Both in terms of the object of the inquiry and the method used in research, the differences between the two periods are quite fundamental.

If we look at the object of the inquiry, we see that the concern of the earlier accounting academics was directed towards providing a theory of accounting *practice*. They purported to describe and explain the 'principles' which accountants employed in their day-to-day activities. The contemporary theorists confronted such a theory with something quite different. Initially they worked to construct the alternative accounting theory, this theory to be erected upon the results of an examination of the environment of accounting, rather than existing accounting practice. They believed that this new theory would provide the basis for deriving an alternative set of rules and other operational procedures for use by practitioners. In other words, they hoped to reverse the flow; theory was to be the dominant influence on practice, or so it was hoped, rather than practice totally dominating theory as had previously occurred.

The 1970s are certainly a period in which some of the major over-simplifications of the previous decade have increasingly been recognised. A more sophisticated view of the nature of change in accounting is emerging. Gone are the days when academics believed that the *mere existence* of a coherent, deductive theory based on the accounting environment would mean its early acceptance as the successor to historical record accounting. Gone too for many academic accountants is any uncritical belief in the possibility of producing one general theory capable of being applied to all accounting problems. As is pointed out below, accounting theory will always be quite specific in terms both of time and place. Among academics the 1970s are a period where there is less general agreement than in the previous decade about the most profitable avenues for undertaking research. Experimentation and diversity in theory construction are the order of the day.

Nevertheless the 1960s produced the most trenchant criticism of the theoretical attempts to justify

¹This situation appears to be changing as the profession in both the UK and the US moves away from historical record accounting. However, their apparent choice, general price level accounting, is not without its detractors. See, for instance, Reg S. Gynther, 'Why Use General Purchasing Power?' *Accounting and Business Research* (Spring 1974), pp. 141-157.

²W. A. Paton and A. C. Littleton, *An Introduction to Corporate Accounting Standards* (Urbana, Ill.: American Accounting Association, 1940).

accounting practice³ that we have. This paper is devoted to an examination of some of the main strands of this criticism. In fact, the objections raised against conventional accounting eventually became accepted by most academic accountants and an increasing number of their professional colleagues. They thus formed an important stimulus, both in the past and current decades, to attempts to work out alternatives to the conventional view of accounting.

It seems an especially appropriate time to review historical cost accounting as the major practitioner bodies in the West are taking the *first steps* away from this particular system. And the profession in many other countries is likely to follow the British and US lead.

Differentiating Features of GAAP

Two key characteristics would seem to differentiate the so-called generally accepted principles (GAAP) which comprise conventional accounting. They are, firstly, the great diversity of principles available to the accountant and, secondly, the reliance placed upon historical cost as the primary basis for making accounting measurements.

The Uniformity Question

The great diversity in accounting principles used in the actual preparation of accounting reports constitutes a critical problem for conventional accounting theory. Just over ten years ago Singer observed that accounting was largely 'a matter of taste'.⁴ When recording a particular event, the accountant often can avail himself of a considerable number of different rules even though each would give a different result. Further, the accountant can virtually decide which rule will be selected from those with general acceptance on what are almost invariably unstated grounds.

Within the context of reporting to external parties, to shareholders, suppliers, customers, employees, governmental bodies and the like, this situation still prevails today. It should not be difficult to see that an almost endless series of possibilities for dealing with economic events is offered to the accountant by so-called generally accepted accounting principles. All would be permissible and accepted by the

³This theory is described in various ways: as traditional or conventional accounting theory, generally accepted accounting principles, historical record accounting, and so on. Given the way in which these explanations arose and the nature of accounting principles used by practitioners, all the structures designated as a theory of accounting practice are really based on idealised versions of the bewildering number of rules and practices available to practitioners.

⁴Frank A. Singer, 'Accounting is a Matter of Taste', *Accounting Review* (July 1962), p. 454.

ACCOUNTING AND BUSINESS RESEARCH

external auditor so long as it fell within the wide ambit of GAAP. It is on this multiplicity of rules, procedures, and techniques, the origin of which is often unknown today, that all practising accountants have the discretionary right to draw.

The natural result of this wide range of choice is that the dispersion of values would be very high if a number of accountants were asked to measure the economic significance of the same set of financial transactions. Consequently, any claim that external accounting reports based on GAAP can be used for comparison between different entities, i.e. for inter-firm comparisons, is cast into serious doubts. Even inter-period comparisons can be questionable because the firm may change its principles over time.

Chambers makes this point in a very effective way by showing that:

the number of possible methods, or sets of rules, for obtaining the aggregate amount of the assets of a company which has commodity stocks, three classes of fixed assets and . . . three classes of security investments is $108 \times 24 \times 48 = 124,416!$ And this is only a conservative estimate, which, by considering alternatives implicit in some of the rules such as those for depreciation, could be increased at least tenfold.⁵

By looking at a quite restricted range of rules and procedures from GAAP, Chambers has no difficulty in showing that the number of combinations possible is massive and thus all the certainty and objectivity claimed by adherents to the conventional model is largely illusory.

Historical Cost Measurements

Conventional accounting also uses historical cost measurements in most situations. Historical cost refers to the past acquisition price involved when the relevant transaction occurs, unadjusted in any way for time lags in cash receipts or cash payments and, more importantly, unadjusted for any change in the level of prices generally or the specific price of the item in question. Let us consider an extreme example to clarify the problem that results from the use of historical cost measurements. Imagine that a firm bought a block of land located in the heart of the City of London in 1930. If the firm subsequently erected a building, the amounts paid at various times for both the land and building would be summed and the resultant figure would constitute the gross historical cost of the land and building at that time as well as in the future. Let us assume that the

⁵R. J. Chambers, 'Financial Information and the Securities Market', reprinted in his *Accounting, Finance and Management* (Sydney: Butterworths, 1969), p. 188.

amount involved had been £100,000 and that the assets have a current value today of one million pounds. In this case the £100,000 less depreciation (calculated on the original price) would be the figure shown in the published balance sheet as the net historical cost. The annual depreciation, in historical cost terms also, would be deducted in the firm's income statement.

This type of understatement of the balance sheet value of land and building could occur in the case of all the firm's capital assets and inventory. The consequent effect on the measurement of profit would tend to be the reverse, an overstatement, as depreciation expense and cost of sales would tend to be understated. Some items like sales of the firm's product, wages paid, etc. would tend to be in terms of prices prevailing over the period, i.e. in terms of current average prices.

The overall effect, however, will almost certainly be that the financial position of the business and the income it earns will not be realistically measured but, of course, the firm's external decision makers will have little additional financial information available to them and, consequently, they will be forced to use the accountant's historical cost reports. This major difficulty, coupled with the lack of uniformity in making even historical cost measurements, gives us some idea why conventional accounting has been subject to severe criticism from inside as well as outside the profession. Nonetheless the clearest picture of the glaring weaknesses of historical record accounting comes from a more detailed, systematic scrutiny of the overall theory and all its principal elements in the light of a realistic set of evaluative criteria. This is our task in the remainder of the paper. But, first, what evaluative criteria should we use for our analysis of historical record accounting?

Evaluative Criteria

The first issue I will consider is whether GAAP is or purports to be a general or universal theory of accounting. What does it mean to speak of a general theory? Gilman gives us an answer to this question. A general theory of accounting should contain principles applicable with such a high level of generality that they can be applied to all countries, to all industries and to all firms.⁶ Gilman's tests thus require the general theory to have relevance to different places but at the same time in history. Presumably the universal theory would need to make an even more ambitious claim; the claim that, in

addition to considering all places as general theory does, the universal theory is capable of application to any situation at any period of human history.

Before Darwin some may have made such claims for the natural sciences but certainly no one could seriously do so in the social sciences. Accounting theory is not and can never be a universal theory in this sense. The cave dweller and the feudal lord simply do not require the same information. Our present day accounting rests completely on the economic and social relations prevalent in advanced industrial societies. It is quite specific and makes no sense where these relations do not prevail. Thus, we can say that it is meaningless to criticise GAAP on the grounds that it is not a universal theory. No accounting theory will meet this test.

Perhaps it could be possible to construct a general theory of accounting. This involves making no claims of general applicability in terms of temporal considerations; however, the theory must be relevant to all economic situations prevailing *in a given period*. As one moves from the British factory to even its counterpart in the United States, some doubts about the likelihood of this might arise if only because of the legal differences prevailing between the two countries. However, it is easy to envisage circumstances which would be more difficult to satisfy within the one accounting theory. For example, if we consider the Soviet industrial plant manager or the Peruvian landowner, the reports required are hardly likely to be the same. Obviously in a world economy characterised by considerable diversity, concurrence in terms of the financial information required cannot be expected.

Let us restrict our travels to Britain. Gilman said our general theory must apply equally to all firms and all industries. The activities of a small corner store do not present a complex economic situation to the accountant compared with the information requirements of the directors of a large motor vehicle manufacturer. It is not only that there is a disparity between the scale of activities involved in each case, the activities themselves and the decisions made are in large measure quite different.

Perhaps some difficulties could easily be abstracted at the theorising stage and subsequently reintroduced to cope with actual concrete problems. This solution is not very likely in the case of traditional accounting theory which is merely an explanation and justification of the specific procedures used by accountants in a particular place. The situation is perhaps less clear when we are considering the contemporary rivals to GAAP which are based on assumptions from the environment of accounting and not the present day practice itself. However, even

⁶Stephen Gilman, *Accounting Concepts of Profit* (New York: Ronald Press, 1939), Ch. 13.

here, as the differences between the various business environments are likely to be quite profound, a general theory of accounting does not seem a particularly worthwhile goal for GAAP or any rival accounting theory.

We have now established what claims it would be unfair to make of conventional or any accounting theory. The conclusion seems fairly clear. All theories of accounting will be quite specific in terms of their applicability in time and space. If this is so, what then can we expect from an accounting theory?

For the theory to be adequate we would, firstly, expect that it be internally consistent. We would also want it to rest on realistic assumptions (or conventions as they are quite often called in this context). The role of an assumption in conventional accounting theory is rather different from its usual role in theory formulation. The assumption or convention of traditional accounting theory is aimed at justifying practice rather than describing a relevant aspect of the accounting environment. In other words, the assumption plays a major role in the task of rationalising GAAP. For this reason we will devote a quite lengthy section below to an examination of the conventions of traditional accounting.

In many disciplines it is not uncommon to find several competing theories in the one area of study. This is certainly the case in accounting. In this situation, if the various theories satisfy all the tests we are discussing, we would select the theory with the greatest predictive value. Likewise, the theory which is the simplest and most readily understandable of those available would be preferred if it met all the other tests mentioned. In other words, if more than one theory remained after the primary tests were applied then relative predictability and elegance would become the key considerations.

These tests are only of limited use in our case if only because conventional accounting theory does not, in fact, meet the basic tests. Consequently, a 'run-off' with its contemporary rivals based on predictive power and simplicity is hardly crucial. However, as GAAP fares badly in terms of all tests proposed in this section, applying both these 'run-off' tests as well as the primary tests further strengthens the view that GAAP is not satisfactory.

In addition to those tests already mentioned, the most all-embracing, the most important test by means of which we might judge an accounting theory concerns its ability to satisfy the goal(s) of accounting - does the theory produce information which meets the requirements of the users of accounting reports? While it is logically possible to envisage an accounting theory with internal inconsistencies or faulty reasoning which perchance meets the users' information

ACCOUNTING AND BUSINESS RESEARCH

needs, a structurally perfect theory which does not meet these needs would be regarded as deficient. Therefore, this is really our 'acid test' when considering an accounting theory.

To be acceptable then an evaluation of traditional accounting theory (or any other accounting theory) must reveal affirmative answers to all the following questions:

- (1) Does the theory rest on realistic assumptions?
- (2) Is it internally consistent?
- (3) Does it represent the simplest, most readily understood explanation of the field?
- (4) Does it have the greatest predictive value of all competing theories?
- (5) Does it meet the goal(s) of accounting - in other words, does it produce reports which satisfy the information needs of the users of accounting reports?

These tests are quite conventional ones in the area of theory testing and, although they may not constitute a total evaluation, they are certainly adequate to ground our argument.

The Elements of Historical Record Accounting

To make an evaluation of conventional accounting theory one must identify the elements which comprise it. But if the theory is merely a rationalisation of the so-called generally accepted accounting principles used in practice then different writers are likely to settle on different principles as the major ones and on different ways of explaining them. Of course, the passage of time has seen the elimination of some of these initial differences of opinion but it is still quite true that there is by no means a complete consensus on either the components of traditional accounting theory or the ways used to justify them. To make a brief evaluation I must select only those elements which seem to best represent historical record accounting.⁷

Proponents of conventional accounting theory often argue that their theory is comprised of various different levels, one built upon the other. While this is not descriptive of the way the theory evolved, it is quite useful to an understanding of GAAP to retain such distinctions. A common approach is to

⁷While this avoids making the paper overly long, interested readers should refer to the various interpretations of GAAP in the literature. See, for example, American Accounting Association, *Accounting and Reporting Standards for Corporate Financial Statements and Preceding Statements and Supplements* (Madison: AAA, n.d.); Paul Grady, *Inventory of Generally Accepted Accounting Principles* (New York: AICPA, 1965); Yuji Ijiri, *The Foundations of Accounting Measurement* (Englewood Cliffs: Prentice-Hall, 1967).

see traditional theory as comprised of conventions, doctrines, principles and rules.

Conventions or assumptions should set the boundary lines of the field. They are generally agreed upon but are not themselves tested. The resultant validity of the theoretical conclusions rests in a quite fundamental way on the validity, i.e. the usefulness and realism, of the conventions. Sometimes it is suggested that the conventions of historical record accounting do actually form the base upon which everything else is constructed. This in no sense accords with the actual course of historical development of GAAP but rather stems from a desire to portray the theory as having a structure similar to its more modern rivals. However, the real essence of traditional theory, the conventions and principles, were established after the doctrines and rules of practice had long since been in existence. Thus, to attempt to depict the producing of a theory of accounting practice as proceeding in an orderly and conscious fashion, or to imply that the theory has been used by practitioners to guide their day-to-day work, is a reversal of the actual course of events of accounting history. In terms of both its methodology and its substantive propositions, GAAP is quite different from its contemporary rivals.

In theory the next level of GAAP, the *doctrines*, exist within the boundaries implied by the conventions and assist accountants when they are attempting to apply the principles and rules of accounting. In reality though, it is basically the doctrines and rules themselves which form the part of GAAP that really guide the practitioner. The doctrines differ, of course, in terms of the level of generality involved and their meanings are rather vague, but, together with the rules, they do provide guidelines for the practising accountant whereas the conventions and principles basically perform a

justificatory role rather than affecting accounting practice directly.

The '*principles*' form the next level. They allegedly are the broad theoretical guidelines from which deductions are supposedly made to the *rules*, the procedures and techniques of accounting. LIFO, FIFO and the various other cost of sales and inventory procedures; straight line, sum of the digits and the other depreciation techniques are examples of what is meant by the rules of conventional accounting theory. Supposedly each rule can be traced, directly or otherwise, to the principles; however, supporters of traditional theory rarely attempt to find supporting evidence for the supposed relationship and certainly it is quite tenuous to say the least.

Table 1 contains a listing of what I regard as the key elements of GAAP.

An Analysis of the Principal Conventions

Our first test involves an examination of each major convention of GAAP. This is a particularly important task if, as has already been suggested, they provide such a major role in justifying the use of historical cost and the conventional model generally. Basically, it is the conventions and principles which tell us why we should use GAAP; the doctrines and rules show us how to use GAAP. Thus, if these conventions lack realism the adequacy of the whole structure is in doubt.

In Table 2 is set out the usual meaning(s) attached to each convention, the consequences that follow from it and an evaluation based on the realism of the convention. The examination is usually in terms of various well-known arguments advanced by a variety of writers rather than merely presenting an evaluation

TABLE 1
The Structure of GAAP

Conventions	Doctrines	Principles	Rules
(1) Entity	(1) Conservatism	(1) Matching	The host of procedures and techniques used by accountants in their day-to-day activities, e.g. LIFO, FIFO
(2) Continuity	(2) Consistency	(2) Revenue recognition	
(3) Period	(3) Verifiable, objective evidence	(3) Expense recognition	
(4) Monetary	(4) Full disclosure		
(5) Cost as economic significance	(5) Materiality		
(6) Cost cohesion			
(7) Constant value of money			
(8) Historical record			
(9) Historical cost			

consistent with only one particular view of accounting. In other words, readers will sometimes need to weigh up various contrary positions.

On the basis of Table 2 it seems fair to state that only the business entity and accounting period conventions escape from scrutiny completely unscathed. Some (e.g. the monetary and continuity conventions) could probably be reformulated in such a way as to be acceptable to many. But the remaining five conventions are quite unacceptable and, as these provide the mainstays of the justification for using historical cost measurements, conventional theory must certainly at this stage of our evaluation be seen as questionable. However, before we apply our remaining tests, it is necessary to discuss other major components of GAAP, namely the doctrines and principles.

The Doctrines and Principles of Conventional Accounting

The first doctrine mentioned in Table 1 is the doctrine of *conservatism*. This seems a rather crude response to the uncertainty accountants face in making measurements. If in doubt about the value to be placed on a balance sheet item, following this doctrine, we would err on the side of safety, i.e. in such circumstances we would tend to underestimate assets and overstate liabilities with the consequent income statement effects that such action would produce.

The best known rule to be sanctioned by this doctrine of conservatism is the so-called lower of cost or market rule for the valuation of inventory. Under this rule if the historical cost of inventory is below the market value (normally either current replacement cost or net realisable value), we would take the lower figure for inventory valuation purposes. It could be argued that the rule is internally inconsistent in the sense that if losses are anticipated, should not the same treatment apply to anticipated gains? Of course, consistency would work counter to the purpose of the doctrine.

Where the rule does sanction a departure from historical cost (i.e. where cost was below market value), the difference between these two measurements would be recorded in the income statement as an anticipated loss on the sale of product. The use of an excessively rapid depreciation method (or immediate write-offs of capital assets), and the overstatement of taxation provisions would be other common examples of practices justified by the doctrine of conservatism.

The problem with such rules is that they are often really two-edged swords. If we underestimate the value placed on the firm's capital assets by allowing

ACCOUNTING AND BUSINESS RESEARCH

excessive depreciation charges, then we are being conservative in the early years of the use of the asset; the firm's net assets and profits would initially be understated. But if the magnitude of these charges was such that the capital asset was still in use for a number of years after we had written the asset off completely then, in this later period, as no depreciation cost would be included, in the profit statement the reported income figure (and any rate of return calculated) would significantly overstate the true position. Thus, some rules legitimised by the doctrine of conservatism are internally inconsistent. (Anticipated gains on inventory shares in other companies, etc. are inadmissible, while expected losses are included in the income statement). All rules sanctioned by this doctrine, however, must be self-defeating if they could eventually produce not conservative but inflated results.

The doctrine of conservatism is the most criticised of all the doctrines. But not all the others are beyond comment. The next doctrine listed in Table 1 is the doctrine of *consistency*. Often it is simply interpreted to mean that accounting rules must be used as consistently as possible to permit valid inter-period comparisons of accounting reports. To be truly useful the doctrine would require also the consistency of principles used by different firms so that valid inter-firm comparisons of results would be possible. Shareholders, creditors and other users of accounting information do need to make comparisons between different entities as well as between different time periods for the same entity. We know already from our discussion of the uniformity problem of GAAP that neither inter-firm nor inter-period comparisons are likely to be valid; consequently, it seems clear this doctrine has little impact on practice.

The third doctrine is the doctrine of *verifiable, objective evidence*. The historical record and historical cost conventions would presumably provide the theoretical backing for this doctrine. If the accounting system provides a record of transactions affecting the entity then there should be documentary evidence to support each transaction. In this sense it is verifiable. Objectivity is not so easily attained. For the information to be objective, we would need independent confirmation not only of the occurrence of transactions but also evidence to support the measurement of their economic effects. We already know that the accounting period assumption results in the necessity for many estimates, often mere guesses, before measurement can be made. Further, there are often a variety of quite different rules available to deal with the one situation. Consequently, it is clear that this doctrine will not be implemented

(Continued on p. 195)

TABLE 2
An Evaluation of the Principal Conventions of GAAP*

Convention	Interpretation(s)	Consequences	Critical examination
Business Entity	(1) Each accounting system must be related to a clearly defined area of business activity, or,	(1) The books of the entity and the owners, etc. are separate. (Sometimes the convention, itself, is stated in these terms.)	(1) It is vital to any form of accounting that the area to be accounted for be delineated.
	(2) The business entity is an artificial being which owns assets and is responsible for debts.	(2) The convention, consequently, defines the scope of transactions affecting the entity. All others are ignored.	(2) The accounting entity is a creature of purpose. It is defined to suit the purpose at hand. For example, the sole trader includes both private and business assets when applying for a loan, consolidated reports aggregate separate legal entities' activities, management accounting is heavily reliant on various segmental reports, e.g. accounting by product or branch.
Going Concern, or continuity	(1) (In the absence of evidence to the contrary), the entity will continue operations into the foreseeable future, or	(1) Many adherents to GAAP would argue that, if the convention is accepted, one should reject selling prices as a measurement method.	(3) Interpretation (2) could be seen as confusing an assumption relating to the area of accounting with the entity viewpoint which concerns a particular perception of the firm and its constituents. [†]
	(2) In addition to (1), the entity will continue operating under the same economic conditions and in the same general environment.	(2) It provides the first piece of support for historical record accounting, i.e. the unrecovered cost philosophy.	(1) The only feasible basis on which to account. Versus, accounting information should be the basis of the decision making process but this convention assumes away certain possible courses of action. The precise nature of these courses of action would depend on whether (1) or (2) is the way in which the convention is stated.
		(3) It is the basis of the conventional classification scheme, e.g. fixed/current assets, long term/current liabilities.	(2) The qualification in parenthesis to interpretation (1) makes the convention virtually meaningless. It in effect says if a business is not coming to an end, it will continue. This is not in the form of an assumption.

*This is based on material developed by the author while teaching in the Department of Commerce at the University of Queensland, Australia.

[†]For a very clear summary of the entity viewpoint (and other views opposed to it) see Reg S. Gynther, 'Accounting Concepts and Behavioural Hypotheses', Accounting Review (April 1967), pp. 274-290.

TABLE 2 (continued)

<i>Convention</i>	<i>Interpretation(s)</i>	<i>Consequences</i>	<i>Critical examination</i>
II <i>Continuity – continued</i>			<p>(3) The extension offered in Interpretation (2) is unrealistic.</p> <p>(4) The convention relates to the future which is, by definition, uncertain.</p> <p>(5) It results in a lack of concern with the non-continuing firm. We have no criteria to tell us when to relax the convention and no theory to help us when it is relaxed.</p>
III <i>Accounting Period</i>	The life of an entity may be broken up into arbitrary time periods (usually equal, often one year).	<p>(1) Accounting periods are often out of correspondence with natural cycles of business activity and so the convention leads to a degree of artificiality and to revenue and expense recognition problems, e.g. long term contracts.</p> <p>(2) In other words, it is the major source of subjectivity in the supposedly objective conventional model, i.e. judgment and guessing will always be required to measure such items as depreciation, doubtful debts, etc.</p>	<p>(1) Society demands periodic reports from continuing businesses.</p> <p>(2) Some argue that it is more realistic to see the firm as a series of different ventures and they claim that we should account for it on that basis as they feel more accurate income figures may emerge.</p>
IV <i>Monetary Valuation</i>	It is necessary and possible to express economic events in terms of a common measuring unit, the dollar.	This permits the expression of heterogeneous flows in terms of a homogeneous, universally understood unit.	<p>(1) Useful information might be lost on the conversion of physical data to a common unit.</p> <p>(2) A common measuring unit is a necessary condition for the use of double entry book-keeping.</p> <p>(3) Not all useful information can be expressed in monetary terms but nothing else is shown in the accounts. Further what is not in the accounts is likely to be ignored.</p> <p>(4) Does this convention exclude, for example, physical data from the scope of accounting or merely from formal recording process?</p>

TABLE 2 (continued)

	<i>Convention</i>	<i>Interpretation(s)</i>	<i>Consequences</i>	<i>Critical examination</i>
V	Cost as Economic Significance	Cost is the <i>minimum</i> measure of value expectations at the time of acquiring an asset. (Also, that the decision makers are rational, using this expression in the sense that it is used in classical economic theory.)	(1) This represents a major attempt to establish the relevance of historical cost. We now have a link, tenuous though it may be, between cost and economic value. (Of course, we might make a good buy and thus destroy the possibility of any relationship between economic value and historical cost even when the asset is acquired.) (2) It provides a link between measurement in accounting and valuation in economics	(1) The possibility of changed expectations, conditions, etc. negates its extension beyond acquisition; however, some accountants implicitly attempt to make such an extension. (2) Some would argue that if economic value is what is wanted, it should be measured directly.
VI	Cost Cohesion	Costs combine in the same fashion as physical factors combine in the production process.	This convention is the basis of an attempt to quantify effort and its results in (1) providing a rationale for intra-factory pricing in terms of historical cost (2) the matching of total production costs on an historical basis against revenue, i.e. a supposed matching of effort against accomplishment.	(1) If the attempts to measure economic value suggested in (2) above introduce too much subjectivity, would a current market input or output price be more significant than past cost as an indicator of economic value? (4) Should we be concerned with economic value at all? Can we be concerned with it? (5) Is the rationality assumption realistic? Empirical research suggests rationality is bounded - only some alternatives and outcomes are considered.

TABLE 2 (continued)

<i>Convention</i>	<i>Interpretation(s)</i>	<i>Consequences</i>	<i>Critical examination</i>
VII Constant Value of Money	The purchasing power of the dollar is stable.	<p>(1) It results in the erosion of real capital in times of significant increases in price levels.</p> <p>(2) If the users of accounting reports assume that they are using adjusted reports, incorrect decisions could result. Even if they know that the constant value of money assumption is made, how can readers adjust and why should they have to try?</p> <p>(3) As it is contrary to the real position, some unfortunate social implications may follow, e.g. perhaps inequitable tax burdens, misdirection of scarce resources.</p>	<p>The relevance and predictive power of accounting information is greatly reduced because of this unrealistic assumption.</p>
VIII Historical Record	Accounting should (and does) provide an historical record of transactions (including the internal movement of assets) as they occur.	<p>(1) The books provide an historical record of most aspects of the entity's involvement with the wider economic environment which should provide a useful basis for decision making.</p> <p>(2) It is the basis of the transactions approach which underlies the conventional way of accounting.</p>	<p>Traditional accounting goes further than this convention. Accruals, deferrals, applications of the cost or market rule and other concrete forms of the so-called doctrine of conservatism are not generally regarded as transactions.</p>
IX Historical Cost	Accounting should (and does) make measurements in terms of historical cost.	<p>Supposedly this gives conventional accounting its <i>only</i> method for making measurements. It follows logically from conventions II, V, VI, and VII above. It is really a conclusion rather than a convention.</p>	<p>(1) Historical cost is really imposed by fiat. The method(s) for making measurements should flow from the key concepts and the model as a whole. This convention rules out the consideration of any other possibility at the outset.</p> <p>(2) Where the doctrine of conservatism applies, it may be dropped. This is surely quite inconsistent.</p>

TABLE 2 (*continued*)

Convention	Interpretation(s)	Consequences	Critical examination
IX <i>Historical Cost continued</i>	<p>In fact, it is <i>the</i> conclusion. It could well be argued that the only reason for the inclusion of these conventions is to provide support for this historical cost measurement method.</p> <p>(Historical cost is defined so as to include all outlays made to bring the item to the existing location and put it into use.)</p>	<p>(3) The only conceivable objective historically-based information can meet is stewardship. It seems clear that accounting has a wider function than this.</p> <p>(4) Because of the period convention, historical measurements are often subjective. Objectivity is often claimed to be the prime virtue of historic record accounting.</p>	

in any meaningful sense under historical record accounting.

The final two doctrines, *full disclosure* and *materiality*, do not of themselves provide the basis for any real objection except that they are often formulated in a rather vague manner. To be useful the doctrine of full disclosure should urge the reporting of all information relevant to the users. Quite often, however, the doctrine is given a much narrower meaning — all that is required is the inclusion of any information necessary for the interpretation of the published reports. The wide diversity in terminology in published reports by itself suggests either that the doctrine has no clear meaning or it is often ignored.

We have identified three major accounting principles in Table 1. They relate to matching and revenue and expense recognition. As these principles are so well known, it will not be necessary to dwell upon them here even though they are very important. The *matching* principle merely calls for the measurement of income by matching revenue against the related expenses. In other words, the principle is only one particular method of measuring income, namely, the transactions approach instead of the capital maintenance approach (which involves the comparison of balance sheet values). For this reason it seems confusing to refer to the usual *technique* for measuring income as a principle. It is a principle without great substance. Principles are supposedly the broad, fundamental notions of historical record accounting and yet the matching principle certainly in no meaningful sense describes the income *process*. All we are given is one technique commonly used to measure it.

The *revenue* and *expense recognition* principles are statements of a quite different order. Revenue recognition (or realisation, as it is often called) is one of the key features which makes GAAP distinctive. Realisation in traditional theory essentially means that the revenue recognition point is restricted to the time of the sale of goods. Only in situations where nonsensical results are produced would this interpretation be waived, e.g. strict adherence to the realisation criterion in the case of a long term contract for a bridge construction would mean no profits would be reported until the year when the bridge was completed.

Expense recognition is supposed to occur when we can reasonably associate expenses incurred with revenues realised. Revenue recognition, in theory, completely determines the time for taking up the expenses involved. This follows from the matching principle. However, those expenses which cannot be directly associated with revenue recognition are all simply *assumed* to attach to time periods instead.

Simplicity and Understandability

Perhaps we could argue that traditional accounting, while having questionable conventions and major inconsistencies produced by the doctrine of conservatism, is at least the simplest method of accounting and its reports readily understood by the lay person. Unfortunately not even this is clear. A much simpler system of accounting is to abandon the accrual aspect of traditional accounting, to drop the revenue realisation principle, and return to a cash basis of accounting. This will be objected to by many exponents of GAAP on the grounds that the added complexity of accrual techniques is compensated by the greater relevance for decision making of the statements produced.

Such a claim cannot be accepted at face value. The essentially historically-based conventional accounting reports drawing on a vast range of principles often establish for themselves only a coincidental link with the information required for so many business decisions. Thus, to imply that conventional accounting emerges triumphant from a trade-off between the simplicity of cash accounting and the relevance of the accrual approach somewhat overstates the case. The real question, which will be subsequently reviewed, is whether these two systems really differ in terms of their direct appropriateness for economic decision makers. Both approaches have extremely limited utility for decision making purposes. Certainly the reduced array of rules and techniques is an appealing advantage of the cash system. All that we can say at this stage is that the simplicity argument is by no means clear cut.

The plausibility of the view that for all its difficulties historical record accounting produces reports easily understood by all users is equally questionable. One only has to refer to our early example of the land and buildings in the heart of London shown at £100,000 less accumulated depreciation and yet with a current selling price of one million pounds to realise that although the historical figure has a meaning, it is unlikely to be understood by the shareholder or creditor concerned with questions of future solvency, future profitability and the like.

Predictive Value

The question of the predictive value of historical record accounting relative to its contemporary competitors based on either current or future values cannot be settled in any definitive manner. It is clear, however, that all decision making rests on information about the future and not the past. Consequently, as most accounting theories are based on either current or past measurements, it will normally be necessary to use this information only as the basis for estimates

⁸As well as this the mere existence of a number of different rules to deal with the one situation of course must imply that these different rules are internally inconsistent, one with the other.

An Overall Appraisal

We are now in a position to complete our evaluation of GAAP in terms of all the criteria previously established. It has already been argued that GAAP performs dismally in terms of our first test, namely, the adequacy of the conventions. It is suggested that it is quite easy to demonstrate that conventional theory fails in terms of all the other tests mentioned in this paper. We can therefore proceed to some major examples of where GAAP fails to meet these tests.

Internal Consistency

The most important internal inconsistency between the different levels of traditional theory arises from the inclusion of the doctrine of conservatism which permits departures from historical cost in some circumstances within a theory primarily concerned with justifying the use of historical cost measurements.⁸

Consequently, this doctrine and all the rules employed to implement it in the accounting records, stand opposed to a number of conventions, other doctrines and principles. It is inconsistent with all the conventions already identified as those used to support historical cost measurements. The most obvious clash between conservatism and other doctrines would relate to the doctrine of consistency as conservatism means, for example, that not only different firms but the same firm over time could be using either historical cost, replacement cost, net realisable value or some combination of these for the valuation of inventory. Also, by virtue of permitting measurements other than historical cost, GAAP moves even further away from a strict transactions approach for the measurement of income and this could be seen as a departure from the doctrine of verifiable, objective evidence, at least in the terms in which the adherents to GAAP explain this doctrine. Clearly also, the adherence to a meaningful doctrine of full disclosure could be placed in jeopardy by following the doctrine of conservatism.

The clash with conservatism is no less marked when we move from the conventions and doctrines to principles. The matching principle is often regarded as crucial to income determination and yet the doctrine will surely result in a mismatching if anticipated losses on asset realisation are brought to account.

of future trends. This applies to both conventional accounting and most of its rivals. It does seem likely, however, that the current value models could be more readily adapted to assist in making estimates of future economic events than historical cost data which, to re-affirm our example, gives us information about capital assets and other balance sheet figures which appears often to be of no use as a basis for estimates of the future. The same comment must also be made about the resultant profitability measure.

Ability to Meet Information Needs of the User

The crucial test of course is how well does historical record accounting, or for that matter any method of accounting, meet the information needs of the groups using its output? In relation to the tests already applied, GAAP does not appear to be very adequate. But if it could be shown that despite these deficiencies, the reports did generally satisfy the uses to which they were put then GAAP would be safe from any basic criticism. There would be a need to re-examine the conventions, eliminate logical inconsistencies and the like, but we could regard conventional theory as basically sound. From what has already been said about the predictive power and understandability of GAAP, it is likely that traditional theory will have difficulty in meeting this more general test that accounting reports be appropriate to the user's information needs.

Perhaps it is more useful to ask what information needs GAAP does satisfy rather than whether all are satisfied. For what purposes would a statement of the firm's historical cost financial position and the resultant income figure be useful? In the past the prime function of accounting records was to provide a basis for judging those operating businesses solely in terms of accountability or stewardship. We are using stewardship here in the narrow sense of the physical protection of the assets in the care of the managers. We are not implying anything about the efficiency or effectiveness of resource use.

Certainly there has been pressure on accountants to move away from such a narrowly defined purpose. The whole idea behind the development of accrual accounting is fully explicable in such terms. The original cash basis simply does not allow for judgments on the efficiency and effectiveness of resource allocation but neither does a basis of accounting which merely allows for accruals. Until accountants change their valuation basis from historical cost to current value, there can be no real role for such information directly in decisions about future expan-

sion of capital equipment, future pricing policies, future dividend rates or even evaluation of present performance. Historical record accounting, although more complex than cash accounting, gives us little more in terms of information directly useful to decision makers. Both GAAP and cash accounting are eminently suited to the narrow stewardship goal, which, although important, is certainly not the only purpose that users have in mind. Furthermore, cash accounting information presented in the form of funds statement is a much easier and more effective way of giving an account of stewardship to users not skilled in accounting techniques.

Conclusion

If historical record accounting does not supply the values required for most business decisions then its last and most important justification is gone. In addition to this, historical record accounting lacks realistic assumptions and is internally inconsistent. Its supporters in no sense can attempt to mitigate the effects of these grave deficiencies by arguing that it is simpler and more feasible than its more contemporary rivals based on current values. Certainly it lacks any direct and clear predictive value. If we look to the important components of GAAP, these are the rules and procedures. The rest of the theory is either too vague to be useful (the principles and most doctrines) or mere window dressing (virtually all the conventions). The rules having general acceptance are vast in number and often contradictory. This destroys all real hope of making valid inter-period or inter-firm comparisons despite their obvious importance to decision makers. The defence of GAAP in terms of its objectivity also fails. The extreme diversity of accounting rules, coupled with measurement uncertainty inherent in balance day adjustments, negates this claimed advantage over current values.

There can only be one response to this quite unsatisfactory situation: to improve the alternatives to historical record accounting, evaluate them and press for the adoption of a current value accounting model. The movement away from historical record accounting has already begun. It will certainly continue.

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Rationality and Investment Appraisal

David J. Cooper

Several writers have attempted to explain why the analytical approaches of economics and operations research do not seem to have been widely adopted by companies.¹ This paper is an attempt to explain a particular example of this general phenomenon; it was stimulated by recent research at Manchester University which indicated that many large British companies do not use rigorous investment appraisal techniques.² Indeed, whilst American observers concentrate on explaining why firms in the United States do not explicitly take account of the riskiness of future cash flows,³ it would seem that many UK firms fail to even deal with the time value of money in evaluating investment projects. Instead UK firms seem to relegate formal investment appraisal techniques, such as internal rate of return or present value analysis, to a role secondary to 'judgment'. The results of this recent research deserve investigation. The methods used to select investment projects help to determine both the efficiency with which scarce resources are used and the effectiveness of Government action to stimulate or restrain national investment.

There is considerable agreement, in the literature, on the desirability of using net present value methods of investment appraisal. At the most fundamental level, such methods involve the prediction of future cash flows associated with a project, discounting these flows to present values at the appropriate rate of interest and accepting a project if the present value of its receipts is greater than the present value of its payments. The acceptance of projects which meet

this criterion should increase the value of the firm and hence, the wealth of its owners.

One argument for ignoring such methods stems from the difficulty of estimating future cash flows. This paper examines some of the reasons why financial managers seem to avoid rigorous appraisal techniques which necessitate the explicit estimation of future cash flows. There appear to be several explanations for firms not using rigorous techniques. Most of these explanations focus on economic arguments. In particular, simulated cost-benefit analyses have demonstrated that the costs of sophisticated techniques can, in some environments, outweigh the benefits of the technique.⁴ This paper, however, suggests that a social explanation for the lack of use of rigorous techniques might provide insights both about the process of decision making and the role and activity of financial management. Since the research which stimulated this paper was in the area of investment appraisal, the argument will be developed using this example. The analysis would, however, appear to apply in many situations where predictions need to be made.

The calculation of present values requires prediction of future results and, in a rapidly changing world, this is a formidable task. Acceptance of a project may yield various different results depending on the future states of the world. If single valued estimates of future cash flows are used, managers may conclude that the costs of a present value analysis are likely to be greater than the benefits.

The difficulties of estimation would be reduced if financial managers considered a range of possible outcomes, each estimate being qualified by an expression of the probability of its occurrence. Although several interpretations can be placed on the meaning of a 'realistic' estimate when a probability function is not normally distributed, we will not deal

¹C. West Churchman, 'Managerial Acceptance of Scientific Recommendations', *California Management Review*, Vol. VII, No. 1, 1964, pp. 31-38.

²B. V. Carsberg and A. Hope, 'Business Investment Decisions under Inflation' (forthcoming), particularly Table 2.

³G. L. Sundén, 'Evaluating Simplified Capital Budgeting Models using a Time-State Preference Metric' in *Accounting Review*, April 1974, Vol. 49, No. 2, pp. 306-320.

⁴G. L. Sundén (1974), op. cit.

with the problem of estimating an outcome and its probability of attainment.⁵ Instead, we shall assume that a mean or expected net present value (more strictly, a net present utility) can be calculated in most situations (for example, because the distribution is approximately normal) and that this calculation is made by the use of range estimates. We submit that it is easier for financial managers to estimate that a cash flow in five years' time will be somewhere between say, £20,000 and £50,000 rather than estimate that it will be say, £40,000, or any other single value in the above range. Although the associated task of estimating the probability of occurrence is not a simple matter, Grayson⁶ has shown that, if one substitutes 'optimistic', 'most likely' and 'pessimistic' estimates for numerical probabilities, the practical task of obtaining some description of the range of likely outcomes becomes less daunting. Moreover, it seems reasonable to assume that it is better to make some estimate of relevant considerations than to ignore them. It is desirable that the thought processes underlying decisions should be made explicit rather than allowed to remain implicit; only then is it possible to develop adequate procedures for the control, evaluation and delegation of decisions.

Why is it, then, that probability analysis seems to be rarely used in investment appraisal? Anecdotal evidence suggests that the arguments put forward in support of probability analysis fail to overcome the unwillingness of individuals within firms to make their estimates explicit – an unwillingness which may arise from their fear of criticism in case of error. Such a fear might be reduced by an explanation of the nature of probability. Probability analysis recognises the possibility of various outcomes, implying recognition of the chance that the actual result of a project may differ from the most likely result. An outcome different from the most likely result does not, in itself, reflect on the predicting ability of the individual concerned (although consistent over- or underestimation over time may do so).

Two main reasons may explain the limited use of probability analysis. One is ignorance, the other concerns the various subsystems within the firm.

First, firms may be ignorant of the nature of

⁵The interested reader is referred to an illuminating piece of research, viz. A. J. Berry and D. T. Otley, 'The Aggregation of Estimates in Hierarchical Organisations', paper presented to the Northern Accounting Group of the Association of University Teachers in Accounting at Liverpool University on 25th September, 1974.

⁶C. Jackson Grayson, 'The Use of Statistical Techniques in Capital Budgeting' in A. A. Robichek (ed.), *Financial Research and Management Decisions*, John Wiley and Sons, 1966.

probability analysis and its relevance to investment appraisal techniques. However, economic theory predicts that, in a competitive economy, efficient firms (those who implement optimal decisions) will have a competitive advantage which will lead in the long run to inefficient firms being forced into bankruptcy. Observation indicates that firms survive without undertaking rigorous appraisal of investment opportunities. If we are to sustain the hypothesis of ignorance, we must account for their survival.

Ignorance would be no impediment to the survival of inefficient firms if there were sufficient imperfections either in the product or capital market to blunt the effectiveness of competitive pressures. Economists are not agreed on the effectiveness of competitive forces but it would appear that, at the moment, we cannot reject the idea that markets are basically efficient.⁷

Similarly, ignorance would not result in selective business failures if all firms were equally inefficient, e.g. if no firm undertook explicit rigorous investment appraisal. This argument does not accord with the evidence that although many firms which exist use accounting rates of return or payback to aid decision making about investment, some firms do indeed use sophisticated present value techniques. Another possibility is that investment appraisal is valueless, i.e. a firm will have as high a value from random selection of investments as from formal appraisal. This argument for the survival of firms that are ignorant of the suitable techniques seems to have been given limited support by Klammer's research in the United States.⁸ His conclusion that corporate performance was unaffected by the use, or otherwise, of sophisticated capital budgeting techniques, could, however, be dependent on the accounting measures used to measure corporate performance. The problems of using accounting reports based on historic costs in the measurement of corporate performance and scepticism that the benefits from investment appraisal are invariably equal to the costs of undertaking it, lead me to seek alternative explanations for the limited use made of rigorous techniques. Certainly we cannot fully explain the widespread disregard for rigorous investment appraisal by the use of the ignorance argument.

The second explanation of firms' disregard for

⁷The literature that accountants are most likely to be aware of is that relating to efficient capital markets: for example, see E. F. Fama, 'Efficient Capital Markets: A Review of Theory and Empirical Work', *Journal of Finance*, May 1970, pp. 383-416.

⁸T. Klammer, 'The Association of Capital Budgeting Techniques with Firm Performance', *Accounting Review*, April 1973, Vol. 48, No. 2, pp. 353-364.

formal methods of investment appraisal is based on the suggestion that the behaviour of a firm may be inconsistent with the economist's concept of rationality in decision taking. At its most basic, economists regard rationality as the maximisation of utility using consistent behaviour (defined as a well ordered preference function). Yet, a firm does not possess a mind of its own and, unless we are willing to make the restrictive assumption that there exists some mechanism to ensure that all participants in a firm will behave in a manner consistent with one well ordered preference function, no immediate meaning can be attached to the concept of maximising a firm's utility. People (i.e. individuals) have goals; collectivities of people do not.⁹ Once our interest is focused on events and behaviour within the firm it is not sufficient to assume that all individuals in the firm agree on organisational objectives.

Indeed it would appear that many business organisations display an inconsistent or an ill-defined preference function in decision situations so that 'it is difficult to impute a set of preferences to the decision situation that satisfies the standard consistency requirements for a theory of choice'.¹⁰ If we follow this line of reasoning the assumption of a unique preference function should be replaced by the assumption that the firm is comprised of individuals each pursuing their own objectives within it.

Accordingly we must look at the many subsystems that make up the firm and not just emphasise the rational-economic subsystems. The investment process within the firm should be regarded as a social as well as a financial process.¹¹ As such it is affected by concepts of rationality appropriate to social man, administrative man and political man. Burns and Stalker's study¹² of the organisational impact of introducing the electronics industry to Scottish firms whose experience was only of stable markets and scientific environments, indicates that the response of a firm to changes in its environment will often be determined by the self-interest of individuals within the firm. Indeed it was this observation that led Burns to suggest that the firm comprises a 'plurality of social systems' - the recognition that individuals seek to satisfy a variety of needs from the work place.¹³

⁹R. M. Cyert and J. G. March, *A Behavioural Theory of the Firm*, Prentice-Hall, 1963, p. 26.

¹⁰M. D. Cohen, J. G. March and J. P. Olsen, 'A Garbage Can Model of Organisational Choice', *Administrative Science Quarterly*, Vol. 17, 1972, p. 1.

¹¹J. L. Bower, *Managing the Resource Allocation Process*, Division of Research, Harvard Business School, 1970.

¹²T. Burns and G. M. Stalker, *The Management of Innovation*, Tavistock Publications, 1966.

¹³T. Burns, 'On the Plurality of Social Systems', in J. R. Lawrence (ed.), *Operational Research and the Social Sciences*, Tavistock, 1966, pp. 165-177.

ACCOUNTING AND BUSINESS RESEARCH

The functioning of any firm depends on employees who view the organisation simultaneously as work, a career and a political system; it is likely that we will understand the behaviour of firms only if we take account of the interactions of such subsystems - each with its own rationality.

Similarly, Selznick suggests that an organisation may be viewed both as an economy and as an adaptive social structure, the relationship between the two being determined by the consequences each structure has on the other: 'these (the economic and social structures) are united in a context of reciprocal consequences'.¹⁴ His study of the Tennessee Valley Authority suggests that the interdependence between the economic and social systems becomes especially evident when the attention of leadership is directed towards the winning of consent and support for decisions. Producing a rationale for an investment decision can be regarded as one example of such a technique of persuasion.

Economic arguments for rigorous investment appraisal methods (or any other rigorous method of resource allocation) are likely to be ignored if the methods affect the other subsystems within the firm. Employees may attempt to avoid rigorous investment appraisal if they see the associated need to estimate future cash flows as a threat to their own personal goals. Explicit forecasts of cash flows are likely to seem threatening to the individual for although knowledgeable use of probabilities may appear less threatening, the use of probabilistic forecasts of cash flows might still be used as evidence in the political and career systems of the firm. Thus Read¹⁵ has shown that communication between superior and subordinate is affected by the trust felt by a subordinate towards his superior and other personality factors (including the need to achieve).

Quantitative techniques are avoided because they are precise. It is safer to 'sponsor' or adopt a project on the grounds that it is consistent with some vague concept of general policy. Estimation of cash flows need then occur only after the project has been accepted or rejected: calculation, if undertaken explicitly at all, may be biased to confirm the desired decision. The research at Manchester University seems to confirm this argument: 'judgment' is the most popular primary method used to evaluate projects according to the responses of over one

¹⁴P. Selznick, 'Foundations of the Theory of Organizations', *American Sociological Review*, Vol. 13, 1948, pp. 25-35, reprinted in F. E. Emery (ed.), *Systems Thinking*, Penguin, 1969, p. 262.

¹⁵W. H. Read, 'Upward Communication in Industrial Hierarchies', *Human Relations*, Vol. 15, 1962, pp. 3-15.

hundred of the largest British firms.¹⁶ Calculations are then made to confirm a decision already taken. Sponsorship of a project may be desirable for individuals because acceptance of a project might lead to the enhancement of the sponsor's career. Bower¹⁷ presents considerable evidence to show that an investment project is usually conceived by junior managers and is shaped as it proceeds upwards through the hierarchy in the firm. Junior managers use their initiation of projects as a means of getting known within a large firm.

As an investment project is considered by progressively more senior managers within a firm, it requires support. Individual managers will have their own, disparate, goals; it is important to keep the proposal as vague as possible in order that as many people as possible may support the proposal. The requirement of support for a project thus provides a second reason for vague appraisal. Managers with conflicting goals may nevertheless support the same project if they believe that by so doing they will be working towards their own goals. In a different context, Cyert and March¹⁸ refer to this as agreement on logically inconsistent policies.

A third explanation for the use of vague appraisal techniques is that such appraisal enables individuals to continue to sponsor or support a project even if there is a change in circumstances between conception of the project and the final decision. In a rapidly changing corporate environment vagueness is perhaps a synonym for adaptability. Projects can be presented as satisfying the changing needs of the firm; a vague investment proposal is flexible over time.

Our analysis is not suggesting that imprecise investment appraisal is a form of organisational pathology or 'ill health'. Rather, we are arguing that the theory of financial management in the firm should recognise various internal subsystems, each producing behaviour which may be rational in the context of the particular subsystem, and not try to describe the firm as a financial system alone. The analysis does imply that the financial manager may have the following alternative roles:

1. He may accept that the plurality of social systems in the firm is inevitable and recognise his role as being restricted accordingly. He would have to legitimise, through his position as an expert, what he might strictly regard as suboptimal uses of the firm's scarce resources. Projects that command a great deal of political support and commitment within the firm might then be commended

¹⁶B. V. Carsberg and A. Hope (forthcoming), op. cit.

¹⁷J. L. Bower (1970), op. cit.

¹⁸R. M. Cyert and J. G. March (1963), op. cit.

to the final authorising body (frequently the Board of Directors) by using optimistic cash flow estimates. This, we suspect, is the role that many financial managers fulfil at the present.

2. The financial manager might attempt to distinguish between project evaluation and the appraisal of the performance of the individuals who evaluated the project. He would attempt to distinguish between the use of budgets (long term as well as short term) as motivating devices and as appraisal devices.¹⁹ In other words, in using financial information a distinction would be made between the appraisal of an individual (thereby affecting his career within the firm) and the evaluation of cash flows estimates in order to improve future estimates. This strategy of distinguishing between project evaluation and appraisal of the evaluator, might lead to an improved use of scarce resources as judged by the owners of the firm. The role of financial managers in such circumstances, however, is based on the assumption that these managers are curiously free from the career and political orientation of other members of the firm. Although studies of professionalism might provide some evidence that financial managers tend to be 'of the accounting profession' rather than 'of a particular company',²⁰ studies of selective perception indicate that all individuals in a firm can be expected to be influenced by their own personal and departmental goals.

Further, there is some evidence to suggest that Chartered Accountants, when they work in industry, tend to adapt their professional values when these conflict with the values required of accountants in industry.²¹

3. The financial manager might see his role as focusing primarily on earlier stages of the investment decision process: strategy and search. That is not to say that rigorous appraisal should be ignored but rather that the firm should concentrate its scarce resources on the active seeking out of new investment opportunities. Morgan and Luck,²² in their case study of one large UK firm and in

¹⁹A. Stedry, *Budget Control and Cost Behaviour*, Prentice-Hall, 1960.

²⁰See A. Gouldner, 'Cosmopolitans and Locals: towards an analysis of latent social roles', *Administrative Science Quarterly*, Vol. 1, 1957, pp. 281-306, for an analysis of the alternative orientations of administrators within organisations.

²¹A. Hastings and C. Hinnings, 'Role Relations and Value Adaptation: A Study of the Professional Accountant in Industry', *Sociology*, Vol. 4, No. 3, 1970, pp. 353-366.

²²J. R. Morgan and G. M. Luck, *The Investment System within the Firm*, Institute of Operations Research, 1968, p. 20.

their associated simulation study, conclude that if a choice has to be made, the generation of many new ideas and projects for non-rigorous appraisal tends to lead to better financial results than the formal appraisal of a few ideas and projects. If one accepts this view, it follows that financial managers should direct scarce resources within the firm to secure an increase in the number of proposals from which to choose. In such a situation, more attention should be given to the provision of information about the state of the firm's present and future environments. The argument is consistent with Bower's observation²³ that the process of committing a firm to a market is more important than the means of expressing that commitment.

We may conclude that firms seem to ignore rigorous investment appraisal because the concept of a joint utility function for all individuals within the

²³J. L. Bower (1970), op. cit., p. 22.

ACCOUNTING AND BUSINESS RESEARCH

firm cannot be given operational effect. Instead, as a firm is a social system as well as an economy, non-economic variables may be required to explain corporate behaviour in the internal allocation of resources.²⁴ Rigorous methods of investment appraisal are necessary for the efficient allocation of resources within the economy, but unless these methods are also considered within the context of the firm's social system the allocation of resources in society might be non-optimal.

²⁴An attempt to explain the allocation of resources between the firm and its shareholders, by incorporating non-economic variables in the study of corporate finance, is contained in the author's Ph.D. dissertation, *Shareholder Power and Corporate Behaviour*, to be submitted to the University of Manchester.

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A Systems Model for Accountants

R. N. Berry

The basic purpose of this paper is to suggest an open-system based diagrammatic representation of a going concern business against which financial accounts can be compared. The paper is extremely sketchy, and an argument has to be built up from broad observations in order that the limited purpose of this paper may be achieved. As a consequence many interesting and important threads of a more detailed narrative will have to be omitted. The arguments presented are not thought to be conclusive or decisive but they are thought to be stimulating and challenging.

As a beginning it can be said that the concept of a business to financial accountants is one concept. The legal forms which businesses assume serve the convenient purposes of the persons who establish them. Different legal forms merely call for different treatments by an accountant of the owner equity section of the balance sheet. The rest of the balance sheet is built up from conventions which are the same for whatever legal form the business takes on. Thus the accounts of a sole trader, partnership, limited company or group of companies are merely variations of the same theme to a financial accountant. He can distinguish a business entity by ignoring certain aspects of the legal form (e.g. the personal wealth of a sole trader not committed to the business but nevertheless available to business creditors in bankruptcy proceedings) or by looking beyond the separate legal personalities of limited companies in the case of groups. The recognition of a business entity by an accountant depends upon the extent to which economic resources are effectively controlled by one manager, management group, or body of shareholders. Where control is not dominant but nonetheless significant, as in the case of investments in associated companies, accountants have devised a method of reporting which shows the attributable share of profits from the associated company without giving details of the nature of the economic resources from which the profits are derived.

If the boundaries of a business entity for accounting purposes are fairly well defined, the meaning and purpose of financial accounts are certainly not well defined. The use of the term 'a true and fair view' in connection with the financial accounts of particular

businesses is quite clearly a metaphysical description which cannot be handled by the more humble and prosaic techniques of scientific method. Whatever the meaning and purpose of financial accounts may be they obviously are important. As G. A. Lee¹ so eloquently explains: 'Of all the documents about a company which are available to persons other than the directors and senior managers the annual accounts are by far the most detailed, the most rigorously drawn up, the most carefully and solemnly attested, the most regularly produced, the most widely circulated and the most highly publicised'.

In order to understand the nature and purpose of financial accounts, their relationship to the business enterprise has to be examined in more detail. The idea of a balance sheet as a representation or map of a business seems to be a suitable place to start. Consider for example a quotation from Bertrand de Jouvenal.²

'Man possesses mental images, representations of the universe on progressive scales of the things and the agents therein, of himself and his relation to them. . . . Their importance to society is very great; rational individual or collective action must be taken on the basis of what is "known", of the images of reality which have been given currency. These images can be misleading. "Rational" action based on bad "maps" is absurd in the light of better knowledge and can be harmful'.

This quotation seems to be applicable to financial accounts in several ways. The information that is included in financial accounts is based upon what is 'known' to an important degree, and is given currency by being acceptable to the persons who certify the accounts, the persons who receive the published information, and the State. No accountant or businessman would deny that the images produced by historical cost based balance sheets in times of severe inflation can be misleading, and the fact that balance sheets have to be read in conjunction with

¹ G. A. Lee, *Modern Financial Accounting* (Thos. Nelson Ltd., London, 1973), p. 435.

² Bertrand de Jouvenal, 'The Treatment of Capital by Continental Intellectuals' in *Capitalism and the Historians*, ed. F. A. Hayek (Routledge and Kegan Paul, 1954), p. 93.

non-accounting informational inputs before decisions can be made gives support to the idea of mental images or representations on progressive scales.

In order to concentrate upon the relationship between a balance sheet and a business enterprise the question can be asked: Is the balance sheet in any way a model of a business? The answer to that question seems to be a decisive negative. An analogy can be made between a photograph and a person. A photograph is an accurate image of a person but is not a model of that person. Similarly a balance sheet may be a more or less accurate image of a business without being a model. The analogy can be pressed further. A photograph may not be the image desired of a person for a specific purpose. Thus a surgeon may be more concerned to have an X-ray of a person rather than a photograph if he wants to know whether a bone is broken, and in certain circumstances the only way that a surgeon can know whether a bone is broken, without actually performing an operation, is by taking an X-ray. Similarly a user of financial accounting information may be interested in a particular aspect of a company's operations but finds that he cannot obtain the information he desires from the published accounts, and, unlike the surgeon, is not able to get at the desired information in any other way. Thus the idea emerges that even if financial accounts are not actually misleading they may be 'bad maps' in the sense that better quality information could perhaps have been given.

It seems that any improvement in the quality of financial accounting information must come from a better understanding of the nature of a business enterprise. After all the mechanics of double entry accounting have been known for at least six hundred years and there is no great mystery about the art of an accountant. The explanations that accountants can give of the operations of a business, and the images they can produce of its structure and organisation are circumscribed by what can be achieved in terms of a double entry equation. The basic accounting equation can be expanded without limits to provide for all the accounts necessary to classify the inanimate resources and debts owned by a business and the interests of creditors, employees and owners in those resources. It is set to an equality between debits and credits, which means in crude terms that assets must equal claims on assets or else that assets less liabilities must equal ownership claims or equities. The question now to be faced is whether a significant relationship can be established between the accounting equation and the business. It is suggested now that a model of a business in non-accounting terms is essential for testing and explaining this relationship. Without a model the human

ACCOUNTING AND BUSINESS RESEARCH

mind finds it extremely difficult to test, appraise and judge the undoubtedly complex and abstract images produced in financial accounts. To date no model of a business has been produced for financial accounting purposes. Instead, various writers have addressed themselves to the question how best the accounting equation can be formulated in order to 'place logic into the exposition of double entry book-keeping'. The consideration of this last question has only led to such stultifying arguments as to whether the accounting equation can best be stated in such formulations as:

$$(a) \Sigma A - \Sigma L = \text{Equities, or}$$

$$(b) \Sigma A = \Sigma \text{Equities, or}$$

$$(c) \Sigma A - \Sigma L - \text{Shareholder equity} = \text{Nil.}$$

Attempts to say that formulation (a) represents a 'proprietary theory' whereas (b) represents an 'entity theory' are bound to lead nowhere unless some form of correspondence between the accounting equation and a model or concept of a business is achieved. An analogy may help to show more clearly what is meant. Most people have no difficulty in learning to read detailed maps of geographical areas of land. The correspondence between the physical reality of changes in height is easily equated with contour lines. Similarly the correspondence between a red line on a map and a main road on the ground is easily grasped. In other words maps are intelligible because they offer a simple two dimensional representation according to well defined conventions of a known or recognisable three dimensional reality. Financial accounts, on the other hand, do not display a simple correspondence between the things and persons found within a business. Even if financial accounting conventions are considered as being well defined, the correspondence between accounting statements and the business itself is much more complex because businesses are continually changing over time and because financial accounts are stated in abstract value terms. It is no help to suggest that the accounting equation be arranged in a certain way unless the formulation can be compared with at least some simplified model of a business itself. If the business itself cannot be described, appraised or understood in non-accounting terms, the link between a balance sheet and a business can never be established. It is for this reason that attempts to cast the double entry equation in some form or other without reference to a model of a business enterprise seem to be futile. Hendriksen³ gives a good summary of the theories of ownership equity that have been devised but it is apparent that the arguments used to

³Eldon S. Hendriksen, *Accounting Theory* (Richard D. Irwin, USA revised edition, 1970), pp. 495-507.

support one theory or another are more concerned with the nature of the accounting process than with the relationship between the accounting process and the social reality of a business. As Hendriksen observes⁴ 'the problem of valuation and the most relevant concept of income are basically independent of the equity theory selected'.

It can be noted that many approaches to the description of a business in non-accounting terms have been attempted in social sciences other than accounting. For example lawyers have considered businesses as associations of persons and have been concerned to provide a legal framework for the safeguarding of rights and the allocation of responsibilities between the persons forming the business association. The legal structure of a business is thus determined by the variety of persons forming a business association and their inter-relationships. The nature of the rights, duties and responsibilities of all the persons forming a business association (members, creditors, employees, etc.) cannot, however, be divorced from a consideration of the underlying social and economic framework, and from the current predilections within society concerning the appropriate conception of the business enterprise. Thus in Britain the granting of limited liability to investors in businesses before 1855 was actively resisted by Parliament (and endorsed by Adam Smith in *The Wealth of Nations*, 1776) because it was felt that unlimited liability was an indispensable precondition for the achievement of business efficiency.

Economists, concerned with the concept of business efficiency, have concentrated upon a theoretical framework of analysis which considers businesses to be identical with individuals acting as 'economic' men. Classical economic theory developed in the late 19th century offers an explanation of how and why productive resources are allocated between business and industries, and for this explanation it is necessary to assume atomistic competition in the market place. Thus the size of business and the internal arrangements of organisational structure and decision making tends to be ignored. This view of a business as a 'black box' whose internal workings can be ignored persisted even when classical economic theories were modified to deal with imperfect competition, oligopoly and monopoly.

Sociologists and psychologists have been interested in the behavioural aspects of the participants in a business coalition for the last fifty years or so, and relationships between the hierarchical structure of a business and its economic efficiency have been gradually developed in the interdisciplinary area of

behavioural studies. Since the Second World War the development of a systems approach to problems in social sciences has been rapid, and the emergence of the view that a business can be considered to be an open system is probably the most significant advance yet made in the understanding of the nature of a business. This is not to say, however, that systems theory has produced a model of a business for any purpose, nor can one predict, on the basis of what is known, that a model could be developed.

M. Gilbert⁵ in the introduction to his collection of readings on 'The Modern Business Enterprise' makes a detailed case for the adoption of an interdisciplinary approach to the study of a business and suggests that two conceptual tools, the system and the actor, can facilitate this approach by acting as aids to analysis and stimuli to thought. Such a modest and cautious approach to the use of systems thinking is undoubtedly commendable in view of the uncertain and speculative state of present day systems thinking. No detailed appraisal of systems thinking will be given in this paper. Instead the reader is referred to the introductions by Gilbert and F. E. Emery.⁶

Gilbert states that the key aspects of a system which are to be emphasised are, 'that the system as a whole is not just equivalent to the sum of its parts, that its parts are interdependent, that the system is closely related to its environment, and that the system may be divided into various sub-systems'.⁷ The business, viewed as a system, contains human and non-human parts. Humans within a business system can be described as actors and the non-human parts as objects. Since all parts are interdependent the actors and the objects can be viewed as components of the system, and the system cannot be considered to be independent of its components.

A balance sheet will now be given, and its correspondence with a systems based diagrammatic representation of a business will be demonstrated. An attempt will then be made to explain the systems based diagram of the business and to consider its implications for financial accountants.

Example 1

A battery manufacturing company has three manufacturing divisions:

- (a) a lead-acid battery division
- (b) an alkali battery division, and
- (c) a dry-cell battery division.

At Time T₁ the balance sheet of the company is drawn up as follows:

⁵M. Gilbert (ed.), *The Modern Business Enterprise* (Penguin, 1972).

⁶F. E. Emery (ed.), *Systems Thinking* (Penguin, 1969).

⁷M. Gilbert, op. cit., p. 29.

			Lead-Acid	Alkali	Drycell	Total
Shareholder Interests		Non Current Assets	£1,000	£800	£600	£2,400
Legal permanent capital	£2,500	Stocks and Work in Progress	600	300	200	1,100
Free Reserves	945	Assets of Processors	1,600	1,100	800	3,500
Dividend payable	125	Trade Debtors	260	180	130	560
	£3,570	<i>Less Trade Creditors</i>	<120>	<90>	<70>	<280>
12% Loan T ₂₀	1,500	Capital employed – processors	£1,730	£1,190	£860	3,780
Taxation payable	290	<i>Nuclear Assets</i>				600
	£5,360	Head Office Assets plus Research Equipment				400
		<i>Treasury Assets</i>				580
		Cash and Investments				980
		Speculative holding of non-ferrous metals				
						£5,360

However unfamiliar the presentation of the balance sheet of the battery manufacturing company at T_1 may be, it is recognisably a balance sheet built up in double entry accounting fashion.

The balance sheet has been drawn up in this particular way because it can be easily related to the diagrammatic representation of the business which now follows:

Diagram 1 Representation of the Battery Manufacturing Company at T_1

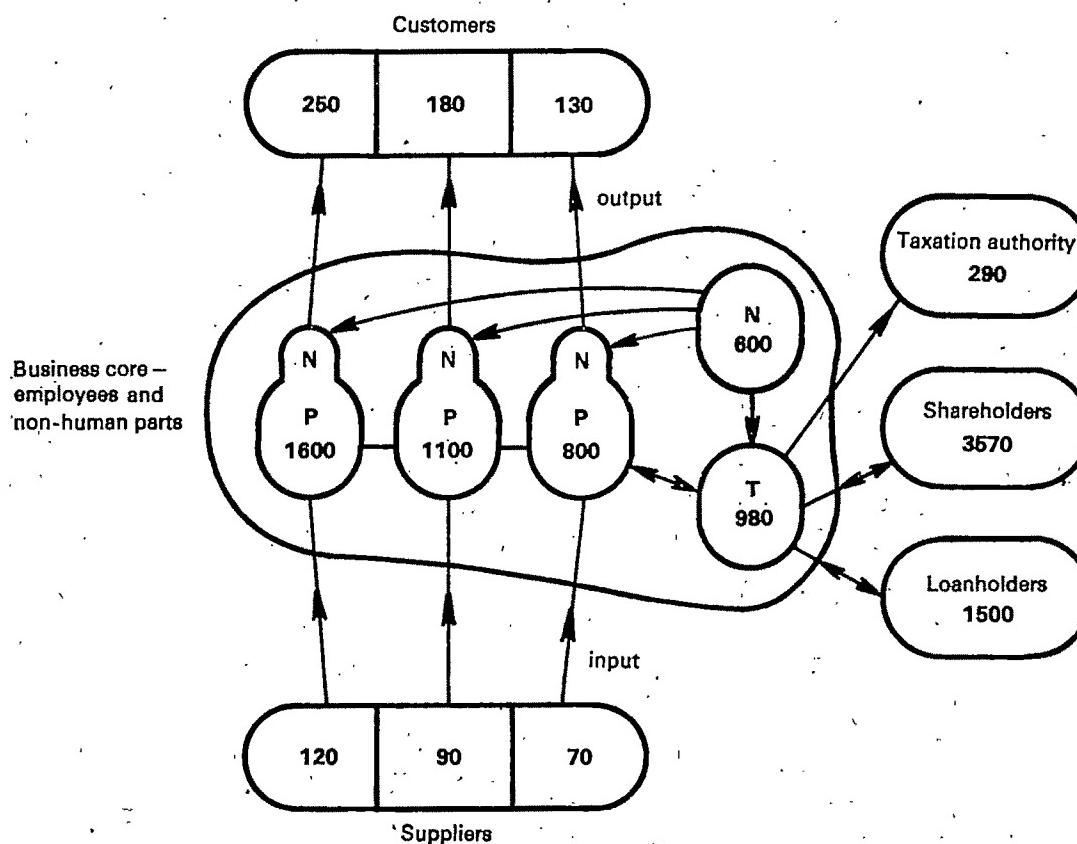


Diagram 1 is an attempt to represent the battery manufacturing business as an open-system for the purpose of relating the balance sheet drawn up at T₁ with a more basic view of the underlying structure of the business and its inter-relationships. Numbers have been taken from the balance sheet in Example 1 and arranged within the diagram. If the book-keeping notational system of debits and credits is used, it can be seen that the accounting equation will balance if the numbers within the business core and customers' section are termed debits, and all other numbers are termed credits. However, the equation will also balance if expressed in the form:

Actors' balances = objects or inanimate assets

Thus shareholders + suppliers + taxation authority + loan creditors - trade debtors = objects or inanimate assets.

The equations will also balance if stated in a number of different forms, of course, which proves nothing except that it is a double entry accounting equation. The only question of interest is whether the diagram 1 helps us to understand the nature of a business enterprise in any important way. The explanation of, and arguments for, the diagram can be given in steps as follows:

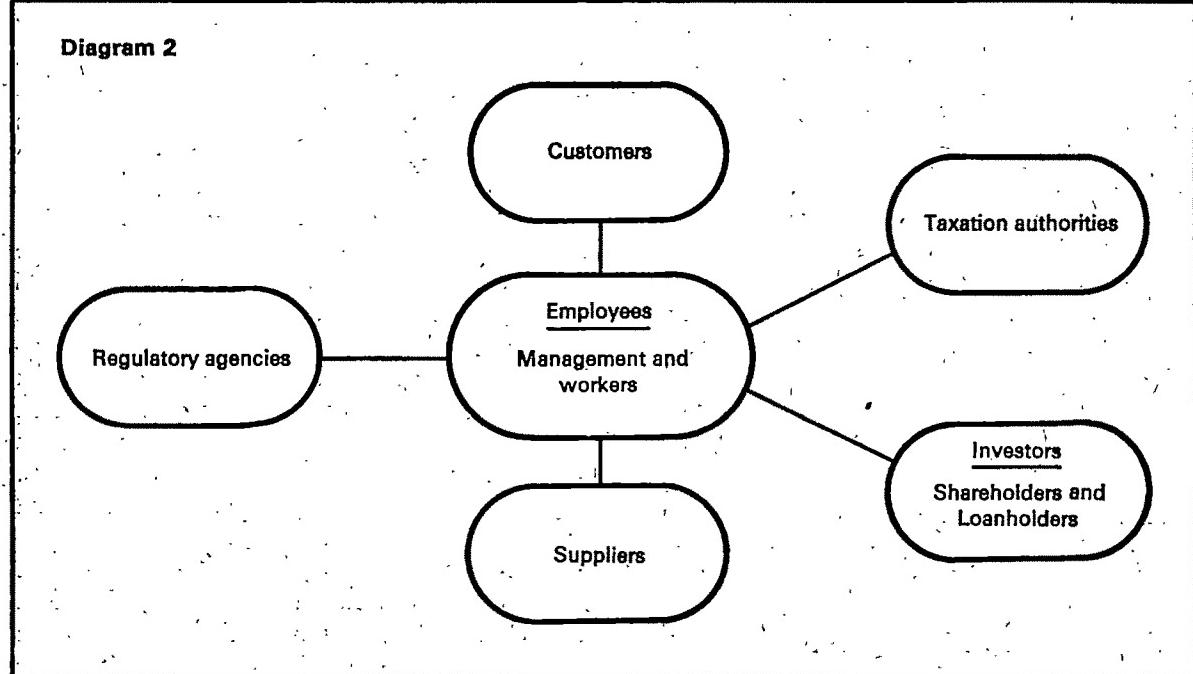
i. A basic viewpoint of behavioural scientists is that a business has to be viewed as an organisation of people in the form of a coalition. Cyert and March⁸ view business organisation as a coalition which includes managers, workers, shareholders, suppliers, customers, lawyers, tax collectors, regu-

latory agencies, etc. The interests of the members of the business coalition may conflict at any point in time in important ways, and the interaction of the conflicting groups within the coalition affect and determine, in the last analysis, the objectives of the business. A business as a coalition could be shown in crude diagrammatic terms as below.

Diagram 2, in one sense, adds nothing to the concept of a business coalition since it does not specify the sorts of conflict which might arise within the business coalition. However, the diagram does suggest that the objectives of any of the groups inside the various boxes are likely to be similar, and as such has some importance. For instance Diagram 2 is meant to represent a management controlled company as distinct from a shareholder controlled company. This is implied by grouping shareholders with loanholders and calling them investors. The separation between taxation authorities and regulatory agencies can be considered significant since it suggests that a central government may have conflicting views with respect to a particular business. A regulatory agency, for example, may wish a business to expand in a development area a long way from its major customers in order to increase job opportunities in those development areas. If a regulatory agency has the power to block expansion by a firm in its most favoured areas and cannot offer adequate compensation for expansion in the less favourable development area it can effectively force a business to accept a lower rate of profitability. This in turn will reduce the amount of taxation that a business will pay to the Government out of its earned

⁸R. M. Cyert and J. G. March, *A Behavioural Theory of the Firm* (Prentice-Hall, 1963), p. 27.

Diagram 2



profits. Management and workers have been described as employees and not as employers and employees respectively. This classification may be questionable, but an argument can certainly be made that the interests of management and workers within the business have more points in common than differences. As employees both management and workers are primarily concerned with their job security, status within the organisation, and with the rewards that they can get from the organisation. The suggestion that managers as employers are more concerned with earning profits for shareholders than in furthering their own ends is an extremely doubtful proposition. Conflicts of interest between management and shareholders can and do arise in an uncertain and risky business environment, as several writers clearly demonstrated.⁹

2. Business enterprises are open systems in the sense that they are open to matter-energy exchanges. D. Katz and R. L. Kahn¹⁰ have pointed out that a study of the input-output relationships of an organisation without identifying the purposes and objectives of its leaders is an appropriate starting place for a theoretical study. Their approach is summed up as follows:

'Our theoretical model for the understanding of organisations is that of an energetic input-output system in which the energetic return from the output reactivates the system. Social organisations are flagrantly open systems in that the input of energies and the conversion of output into further energetic input consist of transactions between the organisation and its environment.'

This approach can be compared with the financial accountant's view of profit from business operations being the necessary 'energetic return' to ensure business continuity. Profit, however, is the return to shareholders, and since a business is formed from a coalition of persons the concept of an energetic return has to be extended to other groups within the coalition. Thus wages, input prices from suppliers, output prices to customers, taxation payments to Government can all be analysed in energetic or value terms to see how they affect the non-shareholder members of the coalition, and whether these energetic (non-profit) returns reactivate these non-shareholder groups. Because the reward to shareholders' profit is reckoned in financial accounting terms as a residual

ACCOUNTING AND BUSINESS RESEARCH

amount, output (sales revenue) less associated input (expenses), it cannot be the case that business profitability is the sole energetic return which reactivates the system. The relationship is better expressed by saying that the sustainable output to customers must be such as to provide energetic returns to all other groups within the business coalition at the level which will ensure their continued participation in the coalition. The conditions necessary for this implied dynamic equilibrium (or steady state) cannot be specified in quantitative or value terms for specific businesses in changing environments, although it can be thought that the conditions necessary for the attainment of a steady state define the character of an open system. The use of the term 'going concern' in connection with business enterprises does convey the idea that a business is an open or living system and suggests that the business should be analysed accordingly. Financial accountants do describe going concern business entities in a different manner from businesses in the process of being liquidated. For example the basis of asset valuations are different in the accounts of a going concern business from the values ascribed to identical assets in the case of a business in liquidation. Values for liquidation purposes are market realisable values, whilst values for assets of going concern tend to be historical cost based input values. Again financial accounts for businesses in the process of liquidation show a ranking of interests of the various groups of the coalition in the cash proceeds from sale of inanimate assets (deferred, unsecured and secured creditors, etc.) which is ignored in the preparation of accounts for going concern businesses.

Thus financial accountants have already arrived at a set of practices and conventions which can be said to recognise some aspects of the open-systems nature of a business. The dynamic aspects of a business, however, are not given expression in a balance sheet. A balance sheet gives a static representation or image of a business at some arbitrary point in time, and it may be drawn up after extensive 'window-dressing' operations have been performed to make the picture more attractive at that date than it would be at other points of time within the accounting year. No suggestion is made that a balance sheet can be drawn up to give anything other than a static or frozen picture of a business at a given point in time. What is suggested is the need for a model or way of looking at a business which recognises and demonstrates its dynamic nature.

3. The ideas of organisation and structure are essential to the understanding of any open-system. The most generally known thesis with regard to systems viewed as wholes is that the whole is greater

⁹M. Gilbert cites the work of D. R. Roberts, H. A. Simon, O. E. Williamson and R. L. Marris in op. cit. (5) above. Readings from O. E. Williamson and R. L. Marris are given.

¹⁰D. Katz and R. L. Kahn, *The Social Psychology of Organizations* (Wiley, 1966), chapter 2. Quotations taken from *Systems Thinking*, op. cit. (9) above, p. 89.

than the sum of its parts. As Angyal¹¹ points out this thesis 'may suggest that a summation of parts takes place, and that besides the summation, a new additional factor enters into the constitution of wholes'. Angyal states that 'wholes' cannot be compared with additive aggregations at all, and suggests a more convincing explanation;

'In aggregates it is significant that parts are added; in a system it is significant that parts are arranged.'

The implications of this statement for the analysis of systems seems to be extremely important because it casts doubt upon the validity of the causal thinking which has dominated scientific thought to date. Thinking in terms of causal relationship may be typified by the logical form, if x then y , where x is the cause and y the effect. According to Angyal the problem can be stated as follows:

'In causal research the task is to single out from a multiplicity of data pairs the facts between which there is a necessary connection. In system thinking the task is not to find direct relations between members but to find the superordinate system in which they are connected, or to define the positional value relative to the superordinate system.'

Now it seems that businessmen have learned to think in terms of the superordinate system and do this in practice, even though the thinking may be superficially similar to causal relationships. For example, in any modern text book of management accounting the problem of capital budgeting is approached in terms of the analysis of differential cash flows reduced to their net present value. A simple example will show how the use of differential cash flow evaluation techniques relate to systems thinking.

Example 2

A business is considering whether or not a special purpose machine should be kept, sold and not replaced, or sold and replaced by another machine. There are three decision alternatives to be evaluated, and the detailed way in which the evaluation proceeds need not be recited here. Instead it will be assumed that the analysis shows the following estimates:

Decision alternative	<i>Present value of decision alternative based on differential cashflow analyses</i>
A. Keep machine	+ £20,000
B. Sell and do not replace	+ £10,000
C. Sell and replace with other machine	+ £40,000

¹¹A. Angyal, *Foundations for a Science of Personality* (Harvard University Press, 1941), chapter 8. Quotation taken from op. cit. (6) above, pp. 17-29.

The rational economic choice would be to implement decision alternative C, provided that this decision did not conflict with other more important decisions that might be considered relating to wider aspects of business policy. In other words if the tactical decision concerning the machine did not conflict with basic strategy, and if there were only three alternative possibilities for the tactical decision regarding the machine it would clearly be in the interest of the business to implement decision C. The logical train of thought process which arrives at the decision C is not, however, a simple causal relationship. It can be summarised in the form: if decision C is implemented then business net worth is immediately increased by £20,000 (decision C less decision A). But this summary is not a simple statement of verifiable fact. The relationship is better explained in terms of systems thinking by saying: If decision C is implemented, and if the business system has the relationships with the external environment postulated in the differential cash flow analyses for the stated future period of time, then the net result will benefit the business by an amount estimated to be £20,000 in present value terms.

The causal relationships now appear to be extremely complex - and so they are. The relationships can be better stated by saying, if decision C and numerous future input-output exchanges associated with the machine occur, then the net benefit to the business of £20,000 (in present value terms) follows. Because causal relationships are so deeply imbedded in our thought process there is a natural tendency to manipulate data to enable a relationship, if x then y , to emerge. In the case of example 2 the decision appears to be made in that simple way but this impression masks the fact that the positional value of the replacement machine to the superordinate system (the business) determines the choice of decision alternatives.

The discussion of example 2 has merely been given to emphasise the importance of the idea of the controlling order of structure within a business organisation. By and large balance sheets ignore the structure of the particular businesses for which they are prepared, although some idea of the structure of a business can be given by a current/non-current classification amongst assets and liabilities. Similarly it could be argued that the distinction between general reserve and retained earnings is made within the shareholder equity section of the balance sheet in order to convey the impression that, under foreseeable circumstances, only assets represented by retained earnings are regarded as freely separable from the business system without impairing the source of future operational profits.

The description of the organisation and structure within the business core can never be fully made in a balance sheet. However, the question of organisation and structure is clearly important to a review of the potential of a business and an explanation of its past achievements. No general model for the description of business organisation and structure can be said to exist though flowcharting techniques, diagrams of the management hierarchy, etc. can do much to convey the details of the organisation and operating methods of particular businesses. It can at least be suggested that any advances in the understanding of the nature of business organisation and structure will have implications for the way in which balance sheets are drawn up and presented.

4. The suggestion is now made that the business core shown in diagram 1 is an example of a general technique for summarising the organisation and structure of business enterprises. Any business core (employees plus inanimate resources) is considered to be built up out of three basic components: a processor, a nucleus and a treasury store. The components are summary terms for functional groupings of persons and inanimate resources, and may be combined in an almost infinite variety of ways. The three components can be described as follows:

Processor	- an input - output system, or output producer. A manufacturing or retailing facility would be a typical example.
Nucleus	- a manager (who may also be the owner) or a management team.
Treasury store	- a reservoir of economic resources (cash, temporary investments, etc.) or energy surplus to current requirements.

The possibilities of combining processors, nuclei and treasury stores within a single business core is demonstrated in example 1. It is freely admitted that the distinction between processors can be difficult to make, and that the criteria for making the distinction can be personal. One battery manufacturer may argue that the manufacture of lead acid batteries is not so different from the manufacture of dry cell batteries as to constitute a separate processor activity. Another manufacturer may disagree and point out that the manufacturing equipment, the suppliers and the customers appear to be different. The problem of separating out classes of business operations under the same management control has been avoided in Section 17 of the 1967 Companies Act. The Act merely refers to the opinion of directors as the basis for distinguishing between separate classes of business operations. Despite the difficulties of

ACCOUNTING AND BUSINESS RESEARCH

drawing distinctions between processors, nuclei, and treasury stores a diagrammatic representation can be made of any particular business in these terms, and the diagram can be adjusted to conform with the opinions of either management or of disinterested persons giving unrestricted access to information within the business. The importance of the idea of three basic components within any business core seems to be in its power to simplify and reduce the conceptual difficulties of understanding business organisations. The idea of three basic components suggests analogies and it can be noted that the terminology of processor, nucleus and treasury store was suggested by a summary of the parts found within a unicellular organism such as an amoeba. In the amoeba the protoplasm is considered to be the processor, the nucleus remains the nucleus, and the fat globules which store food materials are taken to be the treasury store(s). No serious analogy is intended but it is interesting to note that F. E. Emery¹² mentions the argument that 'many of these Gestalten properties are common to the different levels of organisation of living matter (from bacteria to human societies) and hence provide a valid and powerful form of generalisation'.

The discussion given and the arguments cited in 1-4 above may not convince readers that any useful purpose has been served by attempting to look at a business in terms of a diagram like 1. No attempt is made to suggest that this diagrammatic representation proves anything other than the possibility of analysing businesses as open systems in an interesting but essentially speculative scientific manner. Nevertheless, it is the case that financial accountants do utilise what may be termed open system thinking in several important ways:

- (a) the boundaries of a business entity in financial accounting thought are synonymous with the boundaries of a system.
- (b) the values that accountants place upon the inanimate resources owned by a business are determined by the measurements required for matching inputs with outputs so as to determine an energetic return or profit.
- (c) the information presented in the financial accounts of 'going concern' businesses is selected for the purpose of conveying an image or picture of an ongoing system, i.e. a business existing over time and open to matter-energy exchanges. Information which is relevant only for liquidation purposes is ignored.

What can be achieved from a consideration of systems theory is obscure at present but the following

¹²F. E. Emery, op. cit., p. 7.

benefits could possibly be achieved, given time:

- (i) A systems theoretic approach to business enterprises is essentially an inter-disciplinary approach, and the relationships between the viewpoints of financial accountants and other social scientists such as lawyers and economists could be clarified in a way which is not possible at present.
- (ii) The development of systems thinking has enabled scientists to grapple with teleological explanations (or explanations in terms of purpose) in a conceptual framework which appears to be scientific and capable of being logically analysed. Previously teleological explanations were considered to be off limits for scientific thought.

Accountants have been using teleological explanations for centuries in the case of asset valuations. For example the balance sheet valuation of a specialised machine with no alternative uses and no market realisable value at the historical cost or replacement cost of its unused service potential is a teleological explanation. This aspect of financial accounting has long been suspected and criticised by economists. It may be that the development of systems theory will help to validate financial accounting practices, at least in part.

- (iii) The application of systems theory to business enterprises will help to show that financial accounting statements can never amount to explanations 'in principle' of the activities which are undertaken by businesses and the values which decide actions in the market place. Example 2 above is a small

pointer to the view that accounts of past period cannot summarise both the values which decided actions and the values at which particular transactions were made. Double entry accounting statements lack the necessary dimensions to describe a complex system existing over time and a decision has to be made about the information that should be given and the information that should be ignored. In view of the necessity for audit it is clear that financial accounts have to concentrate upon giving information which is verifiable by independent persons even if this information fails to define 'positional values relative to the super-ordinate system'.

- (iv) The development of models or representations of business enterprises based upon systems thinking will, hopefully, improve the terminology used in financial accounting statements and will suggest new and better ways of presenting and analysing financial statements.

As a conclusion some observations will be made about the accounts given for the battery manufacturer in example 1. The sort of profit and loss statement that seems to be appropriate for the balance sheet given in example 1 can be summarised as below.

The profit and loss statement format is merely a suggestion for consideration. Details of the expenses deducted from sales to give trading profit have been omitted for the sake of brevity. It is thought that more detail should be given. Research costs have been

Battery Manufacturer Profit and Loss Statement for period T₀ to T₁

	<i>Lead-Acid</i>	<i>Alkali</i>	<i>Drycell</i>	<i>Total</i>
<i>Sales</i>	x	x	x	x
<i>Trading Profit</i>	x	x	x	x
<i>Nuclear costs</i>				
Management expenses			x	
Research costs			x	x
<i>Treasury items</i>				
Interest and dividends received			x	
Holding gains/losses			x	
Monetary gains/losses			x	x
<i>Loan Costs</i>				
Interest paid			x	
Monetary gain/loss			x	x
<i>Taxation charge – amount payable in respect of the results for the period</i>				x
<i>Attributable to shareholders</i>				
Dividends paid and proposed				x
<i>Balance to balance sheet</i>				x

shown as nuclear expenses and separated from trading expenses. The grouping of research with development costs seems to be inappropriate to the classifications suggested here. Development costs can be classified as current processor costs whereas research costs are non current or future costs which may or may not relate to the processor activities currently undertaken by the business. For instance if the battery manufacturing company is researching into fuel cells or selenium sulphide batteries these costs bear no relation to present processor operations, although they may bear some relationship with future processor operations. The profit and loss format shown demonstrates that non-traditional formats can easily be generated from a consideration of a particular systems viewpoint, but it is admitted that many other viewpoints could be demonstrated.

It is further admitted that what has been described in diagram 1 and explained thereafter does not amount to a complete theory of a business enterprise for financial accounting purposes. Nevertheless there is an identifiable pattern of relationships between the diagram and the financial accounts which makes it a relatively easy matter to develop that viewpoint or to compare it with other viewpoints.

In the balance sheet given for the battery manufacturer no attempt has been made to isolate a single figure for 'working capital'. It is thought that the idea of a single amount of working capital for a complete business entity is too crude for a serious analysis of any business with a complex organisational structure. Instead, current assets and liabilities have been allocated to respective processors or treasury stores. This classification system permits a distinction to be made between the different working capital requirements for separate processors, and between normal stocks and speculative stocks. Any excess quantities of raw materials held in anticipation of a market price rise are shown as treasury items to facilitate the distinction between 'holding profits' and

processor operating profits. Whether or not this presentation system leads one to prefer a 'current value' basis for asset valuations is a problem that will not be discussed in any depth here. However, it does seem that successive balance sheets should show current values for assets which have been held in anticipation of a price rise in the market (e.g. speculative holdings of metal by the battery manufacturer and a portfolio of quoted securities in the case of an investment trust company). Unless the market price changes of assets held across an accounting period are shown, the environmental changes which vitally affect business decisions and which affect the values (in part, at least) that can be imputed to the system as a whole will be ignored.

A more detailed analysis of the diagram 1 and the implications of systems thinking may well lead to the conclusion that the distinctions between processor and treasury store are not capable of being defined in an absolutely precise manner. It is certainly the case that accounting terms such as 'transaction' and 'asset' can only be defined in general terms and not with absolute precision. If the conclusion is eventually reached that financial accounting statements can never be more than interpretations of business enterprises according to a set of socially acceptable and useful rules which are nonetheless equivocal, this author would not be in the least bit surprised. The conclusion seems to be more or less inevitable from a preliminary survey of systems-theoretic considerations. Notwithstanding this somewhat gloomy prognostication two things seem to be clear and worthy of note:

1. Financial accounting statements will continue to be important as representations or images of business enterprises.
2. Financial accounting theory can be developed and clarified, within limits, by the application of systems thinking, and by the development of systems based diagrams and models.

Multiple Optima and Sensitivity Analysis in the Product Mix Problem

Patrick B. McKenzie

The optimal solution to a linear programming problem is sometimes unique, which implies that no other feasible solution exists that produces a better answer or as good an answer. Most discussions of linear programming in the accounting literature deal with the unique solution example. In certain situations, more than one feasible solution to a linear programming problem is optimal. In other words, several different solutions produce the same answer and the answer produced is the best one possible given the existing constraining factors. This situation is often referred to as the multiple optima or alternative optima case. The existence of multiple or alternative optima in practice is a fairly common phenomenon (Wagner, 1969, p. 110; Levin and Lamone, 1969, p. 196).

The optimal solution to a linear programming problem depends on the values of the various model parameters. If any of these parameter values change, the optimal solution may change. Sensitivity analysis can be used to determine how responsive the optimal solution is to changes in the values of the underlying parameters.

The primary purpose of this article is to examine the implications of multiple optima in linear programming for sensitivity analysis. This examination will be preceded by a brief discussion and illustration of multiple optima using graphical analysis and the final simplex tableau.

A basic familiarity with linear programming terminology and concepts is assumed in this article. Using the standard linear programming notation and

terminology, a maximisation model with n decision variables and m constraints will be represented as follows:

Objective Function:

$$\text{Maximise } x_0 = \sum_{j=1}^n c_j x_j$$

Resource Constraints:

$$\sum_{j=1}^n a_{ij} x_j \leq b_i, i = 1, 2, \dots, m$$

Non-negativity Condition:

$$x_j \geq 0, j = 1, 2, \dots, n$$

where c_j = objective function coefficients
 a_{ij} = technical coefficients
 b_i = requirements vector coefficients
 x_j = decision or product variables

Product Mix Example

Consider the following product mix problem that includes three products (A, B and C) and two resources:

Objective Function:

$$\text{Maximise Profits} = \$10 A + \$8 B + \$5 C$$

Resource Constraints:

$$8A + 2B + 10C \leq 120 \quad \text{Resource 1}$$

$$5A + 4B + 8C \leq 130 \quad \text{Resource 2}$$

Non-negativity condition:

$$A \geq 0, B \geq 0, C \geq 0$$

After adding slack variables (S_1 for Resource 1 and S_2 for Resource 2), the simplex method can be used to find the following final simplex tableau:

TABLE 1
Final Simplex Tableau

Row	A	B	C	S_1	S_2	=
0	0	0	11	0	2	260
1	1	0	12/11	2/11	-1/11	10
2	0	1	7/11	-5/11	4/11	20

The optimal solution contained in Table 1 indicates a profit of \$260 and a mix of 10 units of Product A, 20 units of Product B, and 0 units of Product C. Notice that the optimal product mix fully utilises both resources; there is no slack in either resource.

In Row 0 and columns S_1 and S_2 , the shadow prices (0 and 2) are indicated for Resources 1 and 2, respectively. A zero shadow price sometimes indicates that an excess quantity of a particular resource

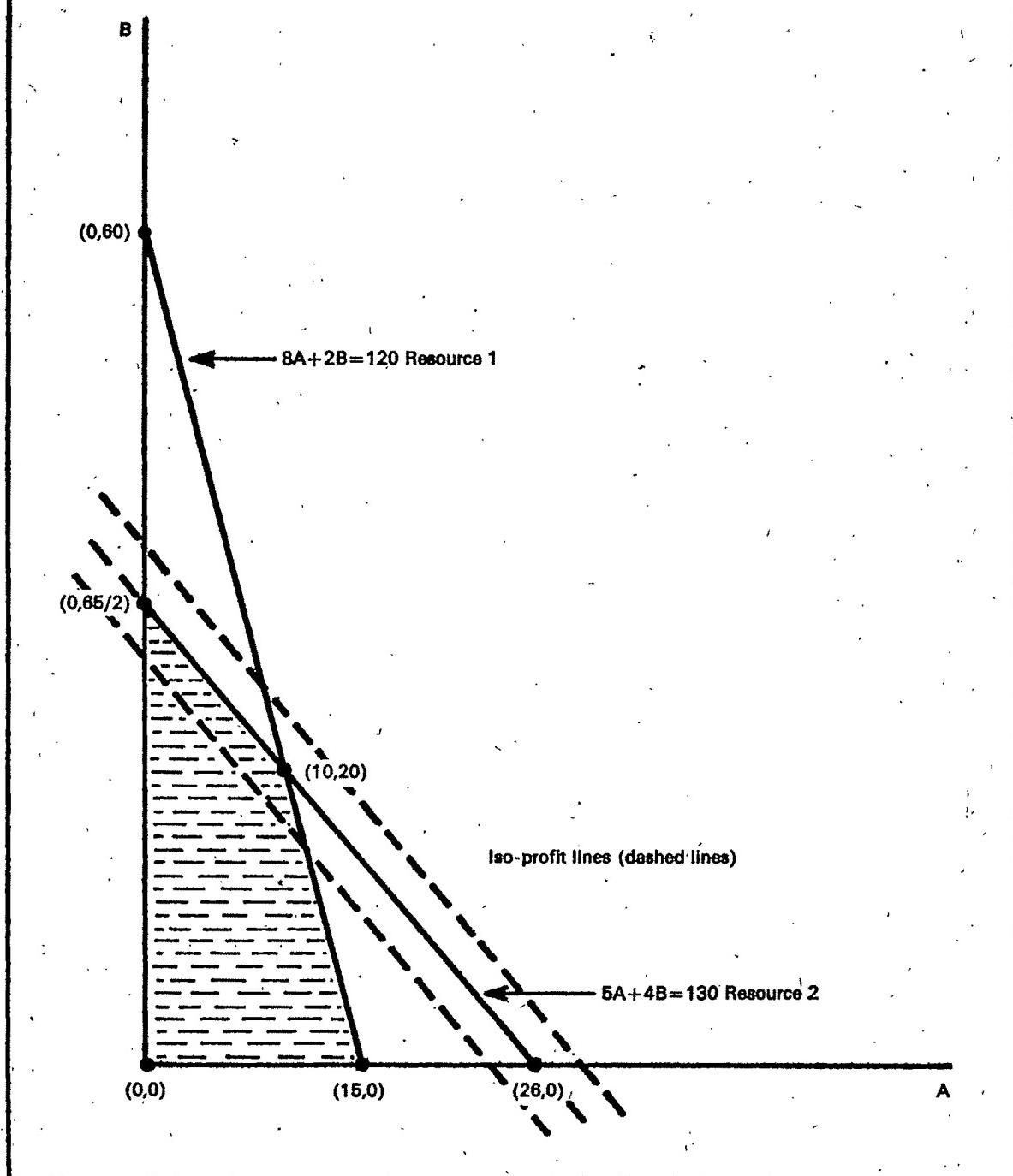
ACCOUNTING AND BUSINESS RESEARCH

exists. However, in this example, the resource with the zero shadow price, Resource 1, is fully utilised.

A two-dimensional graphical representation¹ of this product mix problem can be employed to explain the meaning of the zero shadow price. In Figure 1,

¹For clarity of illustration, a two-dimensional graph was selected to represent a three-dimensional problem. However, note that only two of the products are produced in the optimal solution.

FIGURE 1 MULTIPLE OPTIMA



the two resource constraints and the non-negativity condition define feasibility space (the darkened area) and the related extreme points. Adding a series of iso-profit lines (the dashed lines in Figure 1), two of the four extreme points $(0, 65/2)$ and $(10, 20)$, are identified as representing the optimal product mix. Both produce the same profit as they are on the same iso-profit line. One extreme point $(10, 20)$ fully utilises both resources while the other $(0, 65/2)$ fully utilises Resource 2, but there is slack in Resource 1. Only 65 of the 120 available units of Resource 1 are required by the latter product mix.

In addition to the two extreme points being optimal, any point on the line segment connecting these two points also represents an optimal product mix. In other words, multiple optima are produced when the slope of the iso-profit line is the same as the slope of the line that represents one of the constraints that defines feasibility space.

The previous final simplex tableau can be altered to represent the other optimal extreme point by introducing S_1 as a basic variable^a in place of Product A. The revised tableau below is obtained.

Notice that the zero shadow price for Resource 1 in this case indicates excess supply of that resource; that is, the slack variable that corresponds to Resource 1 is equal to 55 units.

For both of the preceding tableaux, the fact that multiple optima exist is indicated by a zero in Row 0 for a non-basic variable. In Table 1, there was a zero in Row 0 for non-basic variable S_1 and, in Table 2, there was a zero in Row 0 for non-basic variable A.

In summary, a zero shadow price can indicate one of two situations:

1. If the related slack variable is a basic variable, then excess supply exists as depicted in Table 2.
2. If the related slack variable is a non-basic variable, then an alternative optimal solution is indicated as in Table 1. Note that this alternative optimal solution contains excess supply of the resource that corresponds to the zero shadow price.

^aA basic variable is a variable that can be included in the present solution at a positive level while a non-basic variable is defined to be zero.

Therefore, a zero shadow price does imply excess supply of the related resource if not in the present solution then in an alternative optimal solution.

Sensitivity Analysis

Sensitivity analysis seeks to answer the 'what if' question after the initial optimal solution has been ascertained. In a product mix problem the answer of prime concern for planning purposes is usually the product mix itself. But 'what if' one of the values of the underlying parameters, the c_j 's, a_{ij} 's, or b_i 's, changes? Is the previous optimal product mix still optimal? Employing the rules of sensitivity analysis can help answer such 'what if' questions often times without the necessity of resolving the entire model. To a limited extent, sensitivity analysis helps to overcome some of the rigidity of the deterministic linear programming model. One significant limitation of sensitivity analysis in linear programming must be clearly understood. Sensitivity analysis usually assumes a change in one parameter value at a time, and that this change does not affect the value of any other model parameter. For certain changes, as will be noted later, this independence assumption will not be appropriate.

One approach to sensitivity analysis starts with an evaluation of feasibility. Given a particular change, is the previous optimal product mix still feasible; that is, does it still satisfy all the constraints? If the previous mix is no longer feasible, then it can no longer be optimal. If the previous mix is still feasible then the applicable sensitivity analysis rules can be employed to see if the previous mix is still optimal.

In the sections that follow, the sensitivity analysis rules that Jensen (pp. 425-466) outlined in a recent article will be used to answer certain 'what if' questions in the multiple optimal product mix example previously illustrated. Note that in certain cases, Jensen's general rules will be modified so that they are applicable to the multiple optima case.

Objective Function Coefficients

A change in an objective function coefficient (the c_j 's) in the product mix example represents a change in the contribution margin of one of the products. Graphically, in two-dimensional space, this is

TABLE 2
Alternative Optimal Tableau

Row	A	B	C	S_1	S_2	
0	0	0	11	0	2	260
1	11/2	0	6	1	-1/2	55
2	5/4	1	2	0	1/4	65/2

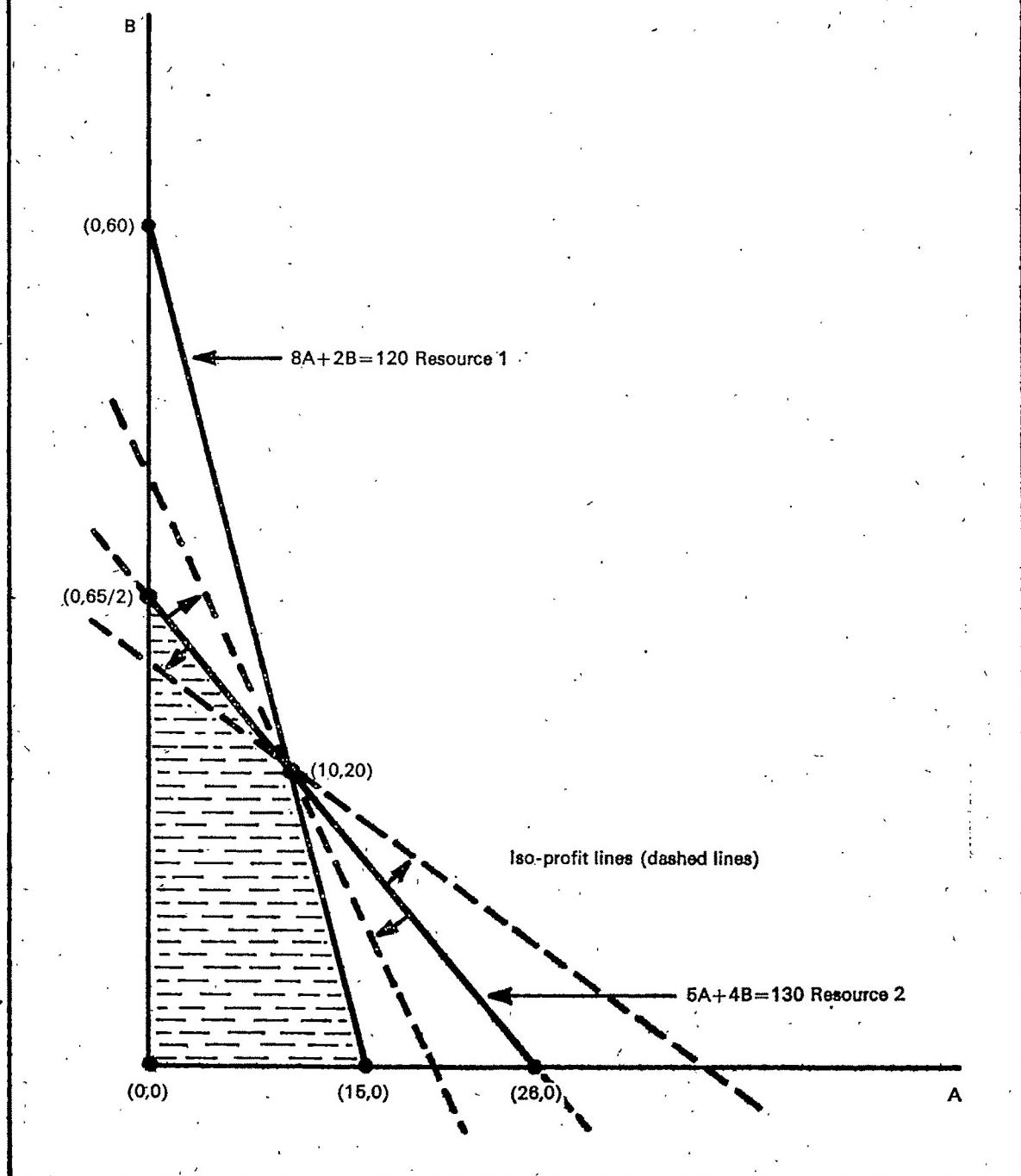
represented in Figure 2 as a change in the slope of the iso-profit line. Depending upon the degree and direction of the change in slope, the existing optimal mix may remain optimal or a new optimal product mix may be indicated.

It should be obvious that any change in a c_j will not affect feasibility. Recall that feasibility space which contains the optimal product mix is defined by the resource constraints and non-negativity

condition. Accordingly, a change in contribution margin will leave feasibility space unchanged.

Although the previous mix is still feasible, it may no longer be optimal. Jensen (pp. 429-432) outlines two sets of rules, depending upon whether x_j is a basic or non-basic variable, to answer this question. If the corresponding x_j is a non-basic variable (Product C in our example), then the maximum increase in c_j before optimality is affected is the

FIGURE 2 CHANGES IN OBJECTIVE FUNCTION COEFFICIENTS



Row 0 coefficient in the x_j column in the Final Simplex Tableau.

The maximum decrease is unlimited. In the previous example, using either the Final Simplex Tableau or the Alternative Optimal Tableau, the maximum increase in c_3 (Product C's contribution margin) is 11 (the Row 0 coefficient for Product C). In other words, Product C's contribution margin would have to increase from \$5 to more than \$16 before it would be profitable to change the existing multiple optimal product mix. If Product C is not included in the optimal mix when its contribution margin is \$5, it should be obvious that any contribution margin for Product C lower than \$5 would also exclude Product C from the optimal product mix.

If x_j is a basic variable, Jensen (pp. 431-432) suggests the following rules where a_{ij}^* represents the revised a_{ij} coefficient in Row i and Column j in the Final Simplex Tableau and c_j^* represents the Row 0 coefficient of x_j in the same tableau:

1. Compute $\Delta c_j = -c_k^*/a_{ik}$ $\begin{cases} k = 1, 2, \dots, m \\ k \neq j \\ a_{ik}^* \neq 0 \end{cases}$
2. The maximum increase in c_j is the minimum positive ratio $-c_k^*/a_{ik}^*$ over all feasible k.
3. The maximum decrease is the maximum negative ratio $-c_k^*/a_{ik}^*$; i.e. the negative ratio closest to zero.
4. If no positive ratio exists, the maximum increase is infinite.
5. If no negative ratio exists, the maximum decrease is infinite.
6. All ratios with zero denominators are ignored.

Employing these rules to determine the allowable changes in c_1 (the contribution margin for Product A), the following Δc_j 's are computed:

1. $-c_1^*/a_{11}^* = -0/1$ Not applicable since $k=j$
2. $-c_3^*/a_{13}^* = -0/0$ Ignore since denominator is zero
3. $-c_3^*/a_{13}^* = -11/(12/11) = -121/12$
4. $-c_4^*/a_{14}^* = -0/(2/11) = 0$
5. $-c_5^*/a_{15}^* = -2/(-1/11) = +22$

Initially, it appears that there is one positive ratio and one negative ratio so that the maximum increase in c_1 is 22 and the maximum decrease is $121/12$. However, graphically in Figure 3 it can be seen that any decrease in c_1 changes the slope of the iso-profit line so that a new unique optimal product mix consisting of $32\frac{1}{2}$ units of Product B is indicated.

The apparent conflict in the answer suggested by graphical analysis and Jensen's rules can be traced to the fourth Δc_j computed above, the zero ratio. This ratio is a result of the Row 0 coefficient, c_4^* ,

and the non-zero denominator, a_{14}^* . Recall that the zero in Row 0 for a non-basic variable signifies the existence of an alternative optimal solution. This case was beyond the scope of the Jensen sensitivity analysis rules.

A modification must be made to deal with the multiple optimal situation. One possible approach which appears to border on mathematical heresy concerns the interpretation of the zero ratio. In mathematics, zero is defined as an unsigned integer, neither positive nor negative. For sensitivity analysis purposes, however, it is convenient to attach a sign to this ratio using the rules that are applicable where there are two signed non-zero numbers involved. In other words, in the previous example, the following ratio would be produced for the fourth Δc_j computed:

$$-c_4^*/a_{14}^* = -0/(2/11) = (-)0$$

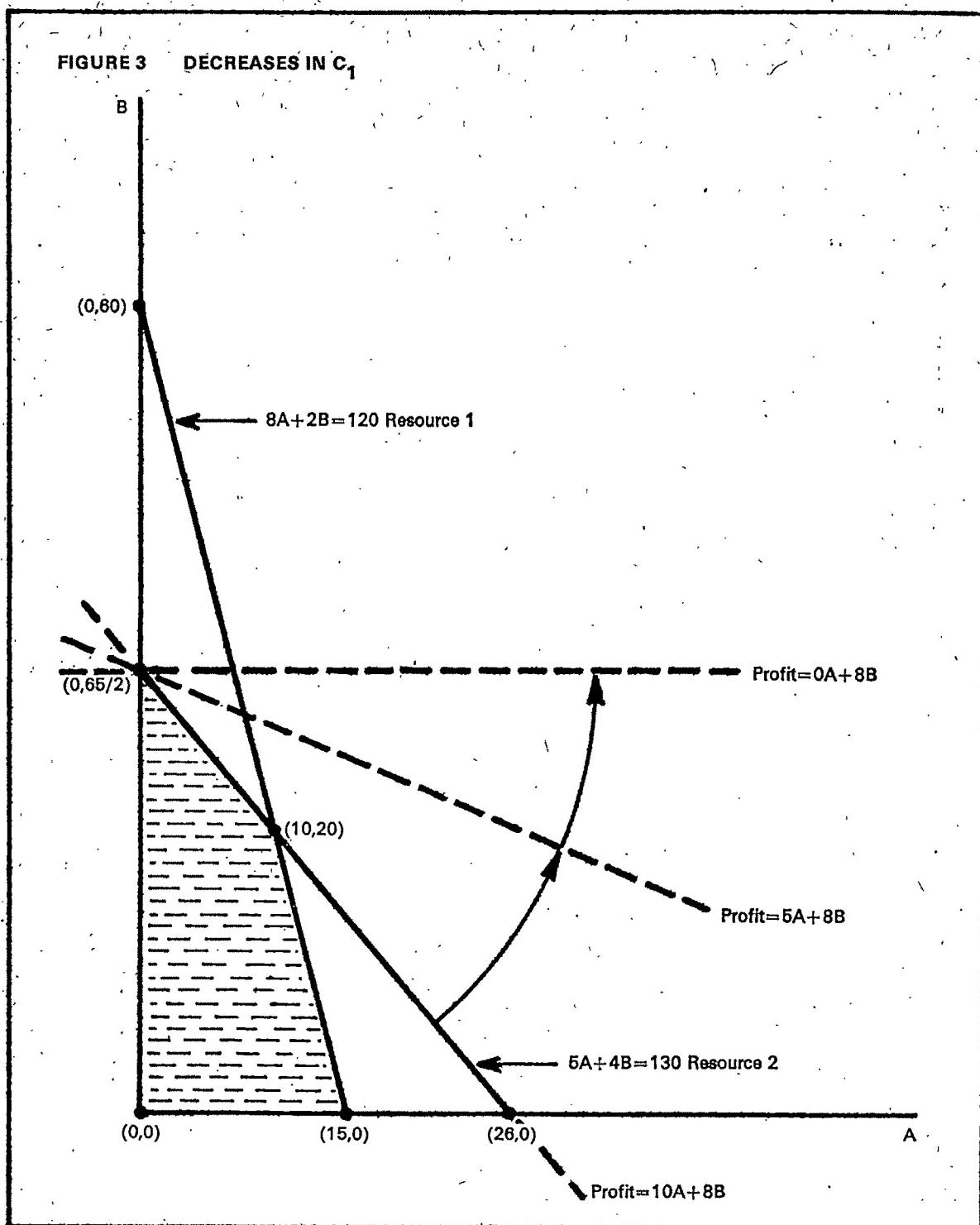
After this modification, there are two negative ratios: $-121/12$ and $(-)0$. Using Jensen's rules, the negative ratio closest to zero is selected to represent the maximum decrease in c_1 . At this point, the answer produced by graphical analysis and the modified Jensen rules is the same: the maximum decrease in c_1 is zero.

An alternative to treating zero as a signed integer which produces the same answer requires more extensive modification of Jensen's rules.

1. Compute Δc_j ratios as before except drop the minus sign from the numerator. In addition, in computing the ratios ignore the sign of the denominators. However, in the interpretation of the ratios, segregate the ratios into two groups: those produced by a 'positive denominator' and those produced by a 'negative denominator'.
2. The maximum increase in c_j is the ratio closest to zero for all the 'negative denominator' ratios.
3. The maximum increase in c_j is the ratio closest to zero for all the 'positive denominator' ratios.
4. If there are no 'negative denominator' ratios, then the maximum increase is infinite.
5. If there are no 'positive denominator' ratios, then the maximum decrease is infinite.
6. All ratios with zero denominators are ignored.

Employing these modified rules to determine the allowable changes in c_1 , the following ratios are computed:

- $|c_1^*/a_{11}^*| = 0/1$ Not applicable since $k=j$
- $|c_3^*/a_{13}^*| = 0/0$ Not applicable since denominator is zero
- $|c_3^*/a_{13}^*| = |11/(12/11)| = 121/12$ 'positive denominator' ratio
- $|c_4^*/a_{14}^*| = |0/(2/11)| = 0$ 'positive denominator' ratio

FIGURE 3 DECREASES IN C_1 

$$|c_{1*}/a_{1*}| = |2/(-1/11)| = 22 \text{ 'negative denominator' ratio}$$

The maximum increase in c_1 corresponds to the 'negative denominator' ratio closest to zero: 22 in this example. The maximum decrease in c_1 corresponds to the 'positive denominator' ratio closest to zero: 0 in this example.

A further minor modification may be made in the

Jensen rules. The c_j ratios need be computed for only the non-basic variable columns. If the ratio corresponds to a basic variable column, the resulting ratio will be either $-0/1$ which is ignored since $k=j$ or $-0/0$ which is ignored since the denominator is zero.

Using the above modification and treating zero as a signed integer, the sensitivity analysis appropriate for

c_3 follows:

$$\begin{aligned}-c_3^*/a_{23}^* &= -11/(7/11) = -121/7 \\ -c_4^*/a_{24}^* &= -0/(-5/22) = (+)0 \\ -c_5^*/a_{25}^* &= -2/(4/11) = -11/2\end{aligned}$$

Accordingly, the maximum increase in c_3 is zero, while the maximum decrease is $11/2$.

Recall that the Final Simplex Tableau (Table 1) identified an optimal product mix of $A=10$, $B=20$, and $C=0$. The following results based on the modified sensitivity analysis rules summarise the sensitivity of this solution to changes in the objective function coefficients, the c_j 's:

Objective Function Coefficient	Maximum	
	Decrease	Increase
c_1	0	22
c_2	$11/2$	0
c_3	∞	11

In words, any increase in c_1 or any decrease in c_1 will result in a different optimal product mix. However, any decrease in c_3 will have no effect on the present optimal product mix. Similarly, certain increases in c_1 or in c_3 , or decreases in c_3 will have no effect on the optimal mix.

Recall that the Alternative Optimal Tableau (Table 2) identified an optimal product mix of $A=0$, $B=65/2$, and $C=0$. The sensitivity of this solution with respect to changes in the objective function coefficients can be summarised as follows:

Objective Function Coefficient	Maximum	
	Decrease	Increase
c_1	∞	0
c_2	0	∞
c_3	∞	11

Note that the solution identified in the Alternative Optimal Tableau appears to be slightly less sensitive to changes in the c_j 's than the solution in the Final Simplex Tableau.

In addition to the two optimal solutions represented by the two extreme points ($10, 20, 0$ and $0, 65/2, 0$), any point on the line segment connecting these two points also represents an optimal product mix. The sensitivity analysis for each of these additional optimal product mixes can be summarised as follows:

Objective Function Coefficient	Maximum	
	Decrease	Increase
c_1	0	0
c_2	0	0
c_3	∞	11

In words, any change in c_1 or c_2 would result in a new optimal product mix. Therefore, while these additional optimal product mixes produce the same profit, they are super sensitive to changes in the

objective function coefficients.

For optimal product mixes represented by the two extreme points, certain changes in c_1 or c_2 were possible without changing the present optimal mix. In all three cases considered, the sensitivity analysis for c_3 produced the same results.

If only one extreme point is optimal, then a unique product mix is produced. The sensitivity analysis for a unique product mix situation usually results in the absence of any zero maximum increases or decreases for the objective function coefficients. In other words, the unique solution situation is less sensitive to changes in the objective function coefficients than alternative optimal solutions would be.

Requirements Vector Coefficients

A change in the tightness of a constraint, i.e. a change in b_i , may affect the optimal product mix. From a graphical standpoint as depicted in Figure 4, a change in b_i causes a parallel shift of the line that corresponds to the i^{th} constraint. The appropriate sensitivity analysis (Jensen, pp. 434-437) required the identification of two specific mutually exclusive situations regarding the extent of utilisation of the resource corresponding to constraint i .

If the optimal mix does not fully utilise the quantity of resource i available (i.e. excess supply or slack), then any increase in b_i will not affect the optimal product mix. The maximum decrease before the optimal mix is altered equals the amount of the total resource available less the amount used by the optimal product mix.

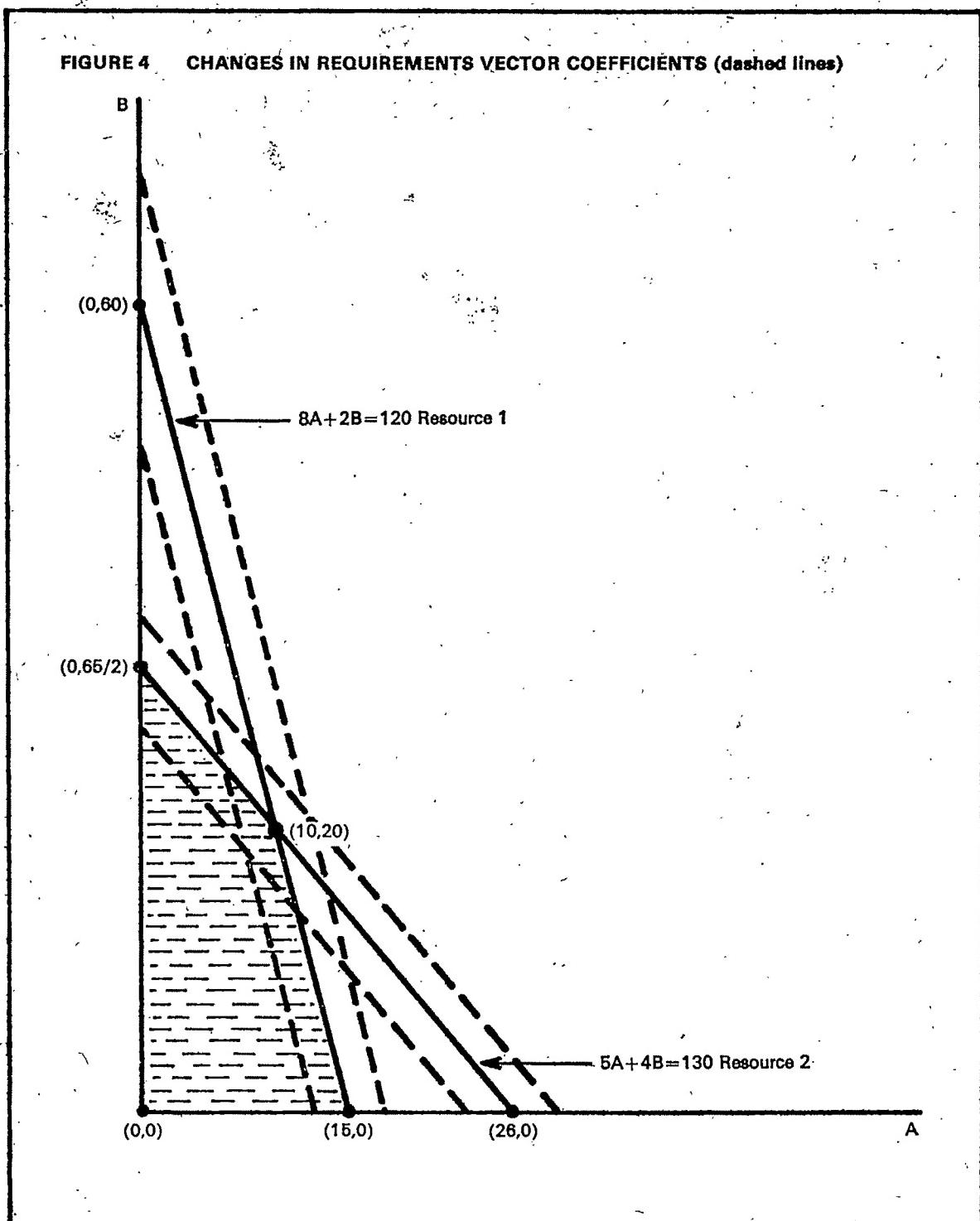
If the resource is fully utilised by the optimal product mix (i.e. no excess supply or slack), then any change, increase or decrease, in b_i will affect the optimal product mix. The new optimal solution can normally be determined by using the data contained in the corresponding shadow price column combined with the amount of the change in b_i . Jensen (pp. 437-438) outlines this computation as well as the related range over which these computations are valid. Outside of this range, the model usually must be resolved.

The existence of multiple optima requires no modification of Jensen's sensitivity analysis rules for b_i 's. In our example, there is a zero shadow price for Resource 1 which is fully utilised by the existing optimal product mix. For certain changes in b_1 , the zero shadow price indicates there will be no change in total profits. However, the optimal product mix will change.

Technical Coefficients

It is important to recall that sensitivity analysis considers the effects of changing the value of one

FIGURE 4 CHANGES IN REQUIREMENTS VECTOR COEFFICIENTS (dashed lines)



of the underlying parameters while holding all the others constant. For example, a change in a_{1B} , the amount of Resource 1 needed to produce one unit of Product B, is assumed to cause no change in c_B , the contribution margin for Product B. If Resource 2 is a fixed input, then this assumption is realistic. If this resource is a variable input, then the value of c_2 would be affected. The sensitivity analysis that

follows for the technical coefficients (a_{ij} 's) is applicable only if the related resource is a fixed input.

An increase in a_{ij} may affect the feasibility of the existing optimal product mix. If the related x_j is a non-basic variable, then any increase in a_{ij} will not affect feasibility since x_j is set equal to zero in the optimal product mix. The existing mix remains optimal.

If the related x_j is a basic variable, then the maximum increase in a_{ij} depends upon the slack, if any, in resource i in existing optimal product mix. If there is no slack in the related resource i , then the maximum increase is zero since any increase would affect feasibility. If the existing optimal mix is no longer feasible, then it is also no longer optimal. If there is slack in resource i , then the maximum increase is the amount of slack divided by the value of the related x_j in the optimal solution.

The determination of the maximum decrease in a_{ij} is more involved. It is convenient at this point to define the dual variables in this product mix linear programming problem. Using either the Final Simplex Tableau or the Alternative Optimal Tableau, the following values are obtained:

Dual Variable	Related Primal Variable	Row 0 Value
y_1	S_1	0
y_2	S_2	2
y_3	A	0
y_4	B	0
y_5	C	11

Jensen (p. 433) defines the maximum decrease in a_{ij} as follows:

$$\Delta a_{ij}^- = -y_{m+j}/y_i, y_i \neq 0$$

where m = total number of (primal) constraints

If $y_i = 0$, the related Δa_{ij}^- value is not defined and any decrease in a_{ij} regardless of size cannot affect optimality.

Applying these rules to the previous problem and using the values from the Final Simplex Tableau or the Alternative Optimal Tableau, the following limits are indicated:

Δa_{ij}^-	$-y_{m+j}/y_i$	Computation	Maximum Decrease Implied
Δa_{11}^-	$-y_3/y_1$	$-0/0$	∞
Δa_{12}^-	$-y_4/y_1$	$-0/0$	∞
Δa_{13}^-	$-y_5/y_1$	$-11/0$	∞
Δa_{21}^-	$-y_3/y_2$	$-0/2$	0
Δa_{22}^-	$-y_4/y_2$	$-0/2$	0
Δa_{23}^-	$-y_5/y_2$	$-11/2$	11/2

Accordingly, for a_{11} , a_{12} , and a_{13} , any decrease regardless of size in any of the three while the other two stay the same will not affect the optimality of the existing product mix. However, decreases in a_{11} and a_{12} , which represent the technical coefficients for Resource 1 and the basic variables, will produce additional optimal product mixes that result in the same profit of \$260. This is a characteristic of the multiple optima case and is identified by the zero shadow price ($y_1 = 0$).

If the shadow price is not zero as is the case for Resource 2 ($y_2 = 2$), then the maximum decrease will be zero or some positive finite amount.

Summary

A zero shadow price in a product mix problem indicates (1) excess supply of a resource (or excess demand), or (2) the existence of many product mixes that are all optimal, i.e. the multiple optima case. In the latter situation, sensitivity analysis can be performed in the usual manner for any mix that represents an extreme point of feasibility space. The data contained in the corresponding final or alternative simplex tableau for any optimal mix that represents an extreme point can be analysed using Jensen's rules with the one modification suggested for the analysis of the objective function coefficients.

An optimal product mix that does not represent an extreme point of feasibility space must lie on the line segment connecting two optimal extreme points or in the plane if three extreme points are optimal. In general, the sensitivity analysis for this type of optimal product mix will indicate a solution that is more sensitive to changes in the parameters than the optimal product mix that represents an extreme point.

References

- Jensen, Robert E., 'Sensitivity Analysis and Integer Linear Programming', *The Accounting Review* (July 1968), pp. 425-446.
- Levin, Richard I. and Lamone, Randolph P., *Linear Programming for Management Decisions* (Richard D. Irwin, 1969).
- Wagner, Harvey M., *Principles of Operations Research* (Prentice-Hall, 1969).

The Financial Control of Rapid-Growth Firms up to Flotation

P. J. Hutchinson, J. A. Piper and G. H. Ray

Introduction and Background

This article examines the results of an investigation into the development of financial control systems, of a sample of six rapidly-growing firms up to the point of their flotation on the London Stock Exchange. This research, along with an investigation into the financing aspects of the firms involved, the results of which have already been published,¹ was carried out at the School of Management, Bath University, with funds provided by the Esmée Fairbairn Trust.

The sample was taken from a population of 149 companies which had 'gone public' between April 1968 and March 1973, and satisfied one of the criteria used to determine rapid growth. These criteria (see previous article for fuller explanation) were that within ten years prior to flotation a company had either been 'small' according to the Bolton Committee's definition,² or had started business with capital of £20,000 or less, or at the beginning of the ten year period had a turnover of £250,000 or less and profits of no more than £20,000. The six companies chosen from this population were studied in depth and the individual findings written up as case studies.³

For the purpose of the research a financial control system is defined as the formal written communication network of financial information. Throughout this article an explicit assumption is made about the existing state of the theory of financial control. This assumption is that the theory is based on an implicit generalised model of financial control which it is claimed is desirable for the effective and efficient management of industrial organisations. This model is propounded in most management accounting texts,⁴ and consists of using all the existing and most

recent financial control techniques available, for example, frequent profit and resource planning and reporting, standard costing, break-even analysis, discounted cash flow analysis, etc. Most textbooks illustrate the control system of a medium/large firm, in light engineering, producing standard products with a functional organisation structure.

Little research has been carried out into the differing characteristics of financial control systems at various stages in the growth of the enterprise. The Bolton Committee of Inquiry on Small Firms noted that one of the outstanding characteristics of the small firm is the simplicity of its management structure and this, together with a general lack of experience and education, can present problems if the firm grows rapidly. With regard to costing and control information the Bolton Committee concluded that 'cost control and costing data are often so poor that management frequently learns of an impending crisis only with the appearance of the annual accounts or following an urgent call from the bank manager. In less serious cases, lack of costing data may make it impossible to gauge the effects on profits of different levels of activity or courses of action, especially where there is a variable product mix. Credit control and stock control information is often inadequate.'

Research Report No. 11 of the Bolton Committee summarises and discusses the main investigations carried out prior to the formation of the committee being established in 1969. This research report introduces its three papers by stating that relatively little information was found to be available on small firms, and even when available the reported results do not always provide comparisons with larger firms and rarely yield detached information on changes through time. The report notes that the 1963 Exeter Survey⁵ was concerned primarily with the measurement of productivity and factors affecting it. The total number of returns from a one in three

¹"The Financing of Rapid Growth Firms up to Flotation, P. J. Hutchinson, J. A. Piper and G. H. Ray. *Accounting and Business Research*, Spring 1975.

²Committee of Inquiry on Small Firms, 1971, HMSO.

³For more details of the specific companies copies of case studies can be obtained from the School of Management, Bath University.

⁴For example, R. N. Anthony, *Management Accounting, Text and Cases*. Irwin, 1970.

⁵D. C. Corner, 'Financial Incentives in the Small Business'. Occasional Papers in Social and Economic Administration Number 5. London Edutext Publication, 1967.

sample of extractive and manufacturing businesses in the South-West counties of Cornwall, Devon, Dorset and Somerset was 210 (total sample 333), of which 119 were from small firms, 62 from medium-sized firms, and 29 from large firms. Notable differences were found when examining the use of different types of cost controls; for instance, the use of budgetary control by small firms was significantly lower (44.8% using system) than medium-sized firms (71%) and large firms (71.4%). This difference was also noted in a further study in 1966 by Corner in reply to the methods used for assessing investment returns.

In the same region, Hart and Prussman⁶ surveyed in 1963 the use of modern aids to management and of management accounting techniques by industrial and commercial firms in the Southampton area. They found a very marked and statistically significant tendency for budgetary control to be less widespread amongst small firms than large firms. Budgetary control was used by only 14% of those firms in the sample with 100 or fewer employees, but by 84% of those with more than 500 employees. Once again, the number of firms responding in the sample was low, 132 out of 400.

On the other hand, the results of 36 Birmingham manufacturing firms (out of a sample of 123) studied in 1955-56 by A. S. Mackintosh⁷ displayed no tendency for the extent and provision of the firm's budgeting system to differ consistently and significantly between firms of different size. However, the subjective nature of the classification of the budgeting systems, together with the low response rate, cast some doubt on this conclusion. From these studies it is clear that whilst a series of 'snap shots' is available, covering aspects of financial control, longitudinal studies are virtually non-existent. Also no detailed information exists on the development of financial control systems over time in small rapid-growth firms. For these reasons the authors of this article decided to carry out an exploratory study of six firms as a prelude to a full-scale investigation of the total population.

Methodology

The primary problem of collecting data on financial control characteristics is that there are no generally accepted or readily available means of describing or

classifying financial control systems. However, it is possible to describe and classify without a precise definition of the phenomena, and on this basis the authors looked for a means of description and classification of the systems which could be used to compare the systems between companies, and over time. The information collected also needed to be factual and thus verifiable and consistent between observers. Following an experiment in a pilot firm the description adopted was based upon the frequency and type of formal financial information produced within the company. The classification required a means of scaling these descriptions, and eventually a five-point scale between a crude and sophisticated financial control system was adopted.

A 'crude' or Rank 1 financial control system would rely completely on the annual profit and balance sheet reporting. No profit planning, no resource planning and no regular or formalised costing system would exist. At the other end of the continuum a 'sophisticated' or Rank 5 control system would have weekly profit and resource reporting with key variables reported daily. Responsibility centre reporting would be highly developed with an emphasis on profit centres and investment centres. Financial planning would be achieved by simulation modelling, probably on computer. Programming and other quantitative techniques would be used in planning and control. Decision rules for investment and use of funds would be clearly stated. In order to distinguish Ranks 2, 3 and 4 it was necessary to develop scales which measured the extent of historical data and planning data related to nine financial factors. Details of the reporting and planning information available was obtained for the company profit, the company balance sheet, product lines, cash, debtors, stock, creditors and fixed assets. This data collection enabled a measure of available historical information to be computed at various stages in the firm's growth, together with a second measure of the planning information available at various stages. These two measures were then combined into a single measure within a 1-5 scale. This system of classification is an attempt to approach the problem of the lack of quantification in this area. Unlike in traditional financial analysis no formal statements like balance sheets exist which summarise the state of financial control systems. Care is needed in the interpretation of these classifications, since it should be borne in mind that 'sophisticated' is a description of the frequency and type of financial data, not an evaluation of the efficiency or effectiveness of the system. The system may or may not be efficient, but as will be seen the firm can be highly successful with a financial control system classified as 'crude'.

⁶H. Hart and D. Prussman, 'A Report of a Survey of Management Accounting Techniques in the S.E. Hants Coastal Region - Unpublished. (Results have been published in part in the *Accountants Journal*, January 1964 and *Scientific Business*, November 1964.)

⁷A. S. Mackintosh, 'The Development of Firms', Cambridge, 1973.

The data which formed the basis of the classification, plus additional data, was collected by several visits to the six companies. On these visits documentation was collected, a structured questionnaire was used with the finance director or other senior executive and subsequent unstructured discussions were conducted.

So that the financial control variable could be related to the organisation structure it was necessary to introduce a classification system for the latter. To some extent the organisation variable is a surrogate for size. The classification scale for this variable was taken from Lievegoed's 'The Developing Organisation'.⁸ This classification of structure consists of three groups, 'the pioneer', 'the differentiation' and 'the integration' stage. The 'pioneer' stage will tend to be more prevalent among smaller organisations, and will consist of a key person with all other employees communicating directly with him. However, as the number of decisions he faces increases he will tend to delegate certain of these decisions, and this process is eventually rationalised into a 'functional' or 'differentiated' structure, and an explicit formal system of hierarchical relationships is developed. This form of structure can handle more frequent decision making, but the informal relationships between the various members of the hierarchical levels and functional groups can create dysfunctional motivational factors in the form of inter and intra departmental rivalry. The 'integrated' system is an attempt to create a flexible organisation with high team commitment and formal relationships across functional boundaries, and less emphasis on hierarchical distance. This is the most recent form of organisation structure that has been proposed, and is referred to as the matrix form of organisation. The companies were classified within this system by obtaining organisation charts of the companies, and discussing the operations of the organisation with the management.

The Findings

From Figure 1 it can be seen that four companies A B C E started with a very crude almost non-existent financial control system and that during the growth period up to flotation they developed to varying degrees. The same companies started with a 'pioneer' structure; two companies, A and B, exhibited this structure at flotation and the remaining two, C and E, had moved to a 'differentiated' stage. Thus companies D and F started with more sophisticated financial control systems and also had the most

ACCOUNTING AND BUSINESS RESEARCH

sophisticated at the time of flotation. The same two companies started at the differentiated stage and showed signs of moving to the integrated stage. Finally there is positive relationship between the financial control variable and the organisation structure variable, for example D and F are to the right of the other companies in all tables. The company which goes against this general relationship is company A which, during the growth period, exhibited a high degree of development of its financial control system but exhibited little or no development in its organisation structure.

From Figure 1 and with additional background data the six companies were then classified into two types. Type I, consisting of companies A B C E, was characterised by a pioneer structure at least initially, and no formal financial control system at inception; while Type II companies, companies D and F, had a more formal financial control system, and differentiated organisation structures.

Having arrived at this classification it was decided to examine the more detailed dynamics of the factors affecting the developments in each type of company.

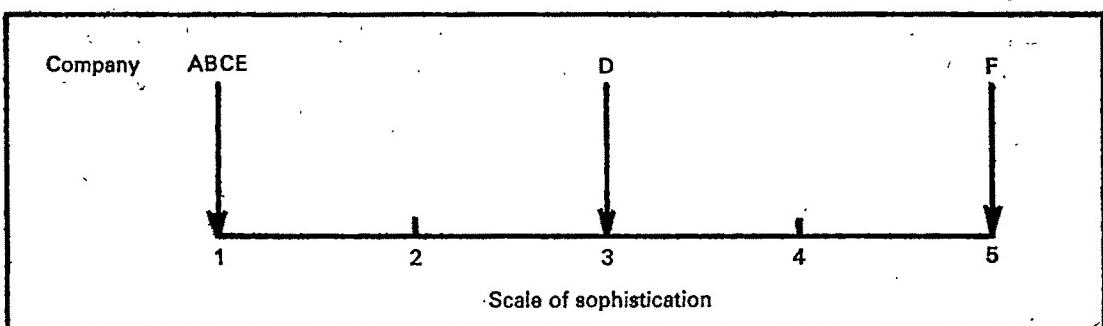
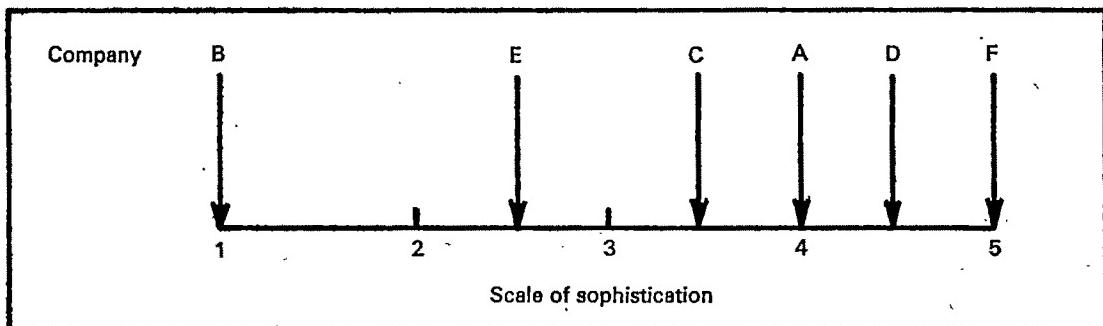
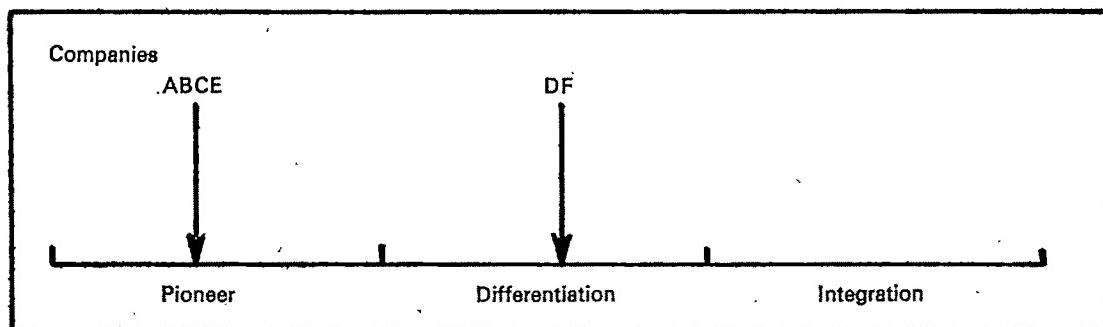
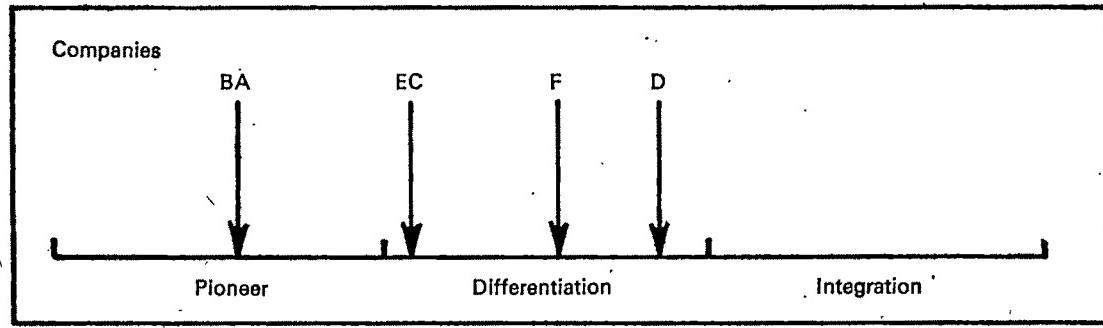
The Characteristics of Type I 'Pioneer Companies'

The specific financial control characteristics of each company were studied in relation to the type I and II classifications. Type I companies started with only annual profit reporting, but all except Company B had monthly reporting by the time of flotation. All the type I companies started with no profit planning, and by inception were producing annual profit plans, once again with the exception of B. In terms of resource planning the type I companies tended to have little formal planning and throughout the growth period the following implicit strategy appeared to be used. There was almost continual pressure on liquidity, and this problem was dealt with primarily by use of trade credit and also bank overdraft. The type I companies did not produce cash flow forecasts until late in their growth stages, and by the time of flotation only companies A and C were producing regular forecasts in the type I group.

The following hypothesis is not directly deducible from the questionnaire data, but is presented as a tentative hypothesis to be considered in relation to the on-going research design, i.e. that there is no significant difference between the financial management of the working capital of a small rapidly growing type I company and a small declining one, except that the former can survive with its illiquid⁹ situation because of the evidence of a profitable turnover of cash, debtors and sales. This can be

⁸B. C. J. Lievegoed, 'The Developing Organization', Tavistock, 1973.

⁹For a more detailed discussion of the companies illiquidity, see previous article on financing.

FIGURE 1a**Ranking of the Financial Control Systems
Prior to Growth****Ranking of the Financial Control System
at Flotation****Ranking of the Organisation Structure
at Inception****Ranking of the Organisation Structure
at Flotation**

contrasted with a more stagnant liquidity problem for a non-growth company.

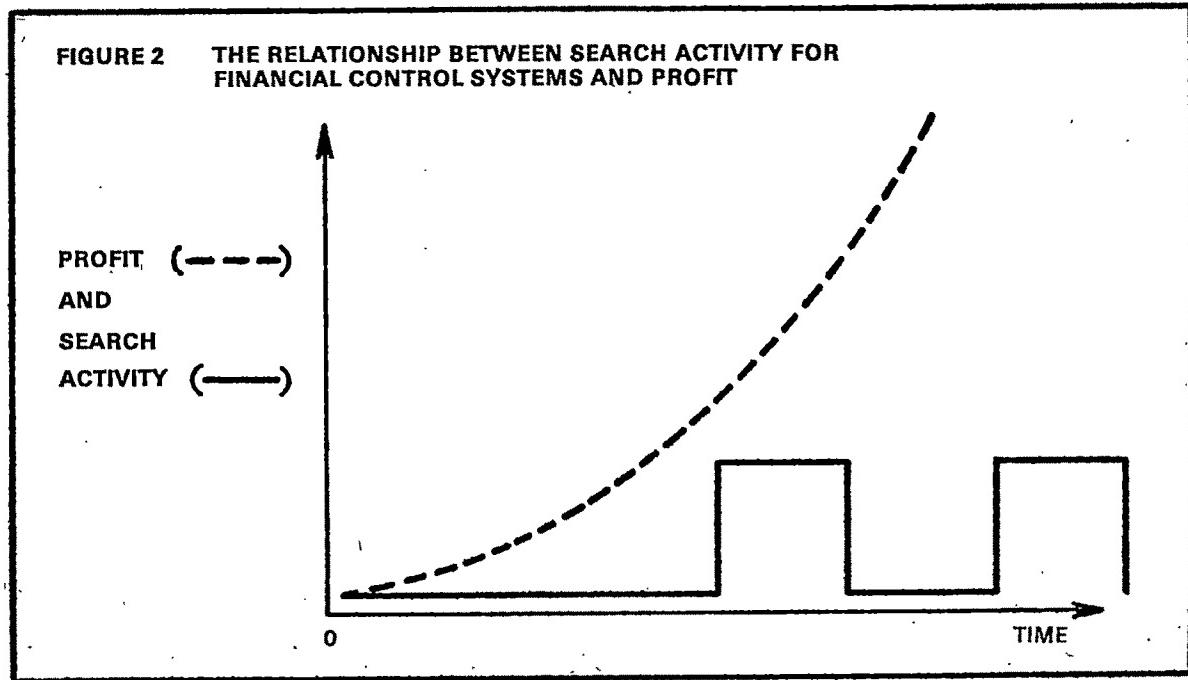
The financial control variable of the type I companies was also related to the profit growth of the four companies, and for each of the four companies it was found that the initial profit growth or take-off preceded the development of the financial control system. There are several potential explanations for this phenomenon in the sample companies; for example, the founder did not feel that he could afford to develop these systems until they had achieved such profits. This lag phenomenon could illustrate that the growth in profit is not related to the sophistication of the financial control systems. However, it is posited that the development of the financial control system also lags behind the formal needs of the senior management for financial control systems, that is to say, that the management needs for control information are not being met. The founder-manager has little formal knowledge of financial control, thus to meet these needs he imports a financial control specialist, and in turn he imports certain procedures of data collection and analysis. When and how long it takes him to do this appears to be variable, but it is after the initial profit growth. Obviously, before this hypothesis can be tested, the term 'management needs for control information' must be described, and how these needs change over time must be explained. *A priori* the needs would appear to be for information which helps structure the environment, provides effective filters for the information, illus-

trates changes in key variables, and provides the information quickly. All this is perhaps initially achieved by means of personal observation, but as the amount of information to be sensed increases, new mechanism to sense the data are required to replace the old ones; these are not immediately obvious, thus the lags. During the lag process, the founder, it is hypothesised, feels out of control and thus searches for a solution; he finds one and thus his financial control needs are once again being satisfied, i.e. there is a discrete movement, a lurch, and the search activity ceases (see Figure 2). These companies, being rapid growth and in perhaps a favourable environment, can 'ride' this lag.

Related to this lag lurch phenomenon in type I companies is the development of the organisational structure. The following sequence of events appeared to take place in a type I Pioneer Company.

- (i) The founder controls the business initially by personal observation and contact. As the business grows, he finds it more and more difficult to absorb and structure the increasing amount of information he collects.
- (ii) He finds that even elementary financial accounts help to formalise, structure and filter the information collection, but he uses these techniques to aid his control still within a 'pioneer' structure.
- (iii) The next stage takes place when the founder is supplemented with one or more specialised directors, and the company then starts to move to a differentiated structure.

FIGURE 2 THE RELATIONSHIP BETWEEN SEARCH ACTIVITY FOR FINANCIAL CONTROL SYSTEMS AND PROFIT



Finally the question of the limited prior knowledge of the founder-manager arises. He felt the need for financial control, not because of profit management, that was growing rapidly, but because of liquidity problems. The founder-managers were not lax in searching out and securing a company accountant. However, when accountants were recruited from the companies' auditors, and this happened in two companies, they left prior to flotation. Accountants with direct industrial or commercial experience appeared to fare better. Without exception the original founders of all companies were exceedingly skilled in obtaining financial information from a number of sources outside the company.

The Characteristics of Type II 'Differentiated' Companies

Both of the type II companies started at the differentiation stage, and during the growth period company D started to exhibit signs of moving to an integration stage of development, for example, participation of departmental supervisors in the budget setting, plus monthly group meetings to discuss performance against budget and to agree new budgets. Company F was based on a decentralised autonomous division structure. The Group Chairman described this as a cellular structure in which divisions are allowed to develop their own resources, with a central group of only five people considering overall corporate strategy.

The type II companies produced monthly profit reports from inauguration but D moved to four weekly reporting after two years. Both companies produced profit plans from inception. Company D modified the basis of its planning by incorporating a structural formula for planning activity on a weekly basis. This formula was also used to analyse variances. The plans were compared with actual profit by company D on a four weekly basis and by company F on a monthly basis.

In contrast to the type I companies resource planning and reporting were carried out as frequently as profit planning and reporting, and explicit policies for debtors, etc. were stated.

The type II companies had directors with considerable financial expertise from inception, the founder of company F being a graduate of the Harvard Business School.

In theory, type II companies should be better placed from the point of view of financial control and organisation structure than type I companies to meet further changes including a down-turn in activity. A further study is now under way to compare the financial performance of such companies after flotation.

Summary and Conclusions

A small sample of six rapidly growing companies has been examined in depth to ascertain pertinent facts about the development of their financial control systems. It would be dangerous to make any academic or policy generalisations about such companies from such a small sample, but on the basis of the limited data several suggestions and tentative conclusions will be proposed.

The development of financial control knowledge has been the result of an interaction between theory and practice. This theory/practice interaction is almost a universal phenomenon and it is felt that development of the study of financial control systems would be aided by even more theory/practice interaction. This has been attempted by collecting data on the practices of some highly successful companies (while not presupposing that success is the result of these practices); the companies have grown substantially and rapidly, thus the financial control development in relation to growth can be observed.

Having obtained these observations, a classification of the financial control system has been attempted. An attempt has also been made to relate the financial control system as a sub-system of an overall organisational process, and the findings to a model of the development of organisations. If it is accepted that organisation structure and control change as the organisations grow, then the management's needs for financial control may change. Also, the movement towards a Scale 5 company in terms of sophistication of the systems has been highly variable. The case for a general model is not proved either way, but more research on a broader population of companies will advance the debate.

The classification of type I and type II may also require further refinement when the total population is surveyed and similarly, the lag-lurch hypothesis will also have to be tested against the total population. In addition it will be necessary to investigate the financial characteristics of these companies after flotation. From this exploratory study it is intended to refine and add to the theories by a data-theory interaction process, similar to the one proposed by Glaser and Strauss.¹⁰ This implies a movement to a more comprehensive theory as the process continues, and at this point it is felt that the theoretical concepts of cybernetics may advance the understanding of the relationship of financial control to organisation structure, and this will be considered when preparing the on-going data collection. It is imperative that

¹⁰B. G. Glaser and A. L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Weidenfeld and Nicolson, 1968.

management accounting moves from a technique orientation to a causal model of its inter-relationship with organisational processes and other variables so that a more rigorous prescriptive approach can be prosecuted into what types of financial control a specific company *should* have at various stages of its development.

From a practical policy point of view it appears that the assistance for the development of financial control in small companies is rather restricted, and that the companies' auditors have limited success in this area. The lag-lurch hypothesis presents a precarious situation for the type I companies in

ACCOUNTING AND BUSINESS RESEARCH

terms of being pro-active in dealing with future problems. Whether a more formal, publicly available service for advice about financial control, like the one being attempted by the Department of Industry's Small Business Information Centres, will have any impact is too early to say, but it is our contention that before a valuable policy can be developed, more in-depth empirical research is necessary.

The Social Science Research Council have recently made an award of £15,144 to Mr. G. H. Ray and Mr. P. J. Hutchinson in order that the second stage of the investigation into small rapid-growth firms may be completed.

Tax Uncertainty in Project Evaluation: A Case Study

A. J. H. Orhniel and L. P. Foldes

Introduction

Much attention has recently been devoted to the improvement of techniques for the appraisal of investments whose returns are uncertain. The use of sophisticated methods of analysis is particularly appropriate in the evaluation of major extractive projects, which typically involve large expenditures during several years followed by highly uncertain revenues accruing over some decades. The system of taxation in force during the construction and exploitation of such a project is among the crucial factors affecting its financial success. Yet little attention appears to have been paid to the evaluation of uncertainties associated with this factor, both in its own right and in combination with other uncertainties. Indeed it seems to be customary when evaluating a project to regard rates of taxation and other features of the tax environment prevailing at the time of evaluation as fixed for the duration of the project, subject to obvious allowances for impending changes and specific contingencies.

The present Paper reports a simple exercise intended to illustrate the extent and sources of variability of the net present value of a project which might arise from changes in tax arrangements during its lifetime. The information used relates to the tax systems of four countries over the period 1948–1969, applied to data prepared from forecasts of cash flows used by the Rio Tinto Zinc Corporation in the evaluation of three major mining projects. The results obtained suggest that the analysis of tax risks does merit further research, and indicates some points which such research should take into account.

Method

The essential steps of the exercise can be summarised as follows. Three examples of mining projects were considered, each with a different general structure of cash flows. Each project was supposed to be evaluated in the same year in each of four countries. For each of the resulting twelve cases, two net present values were calculated and compared: one on the assumption that the gross cash flows were subjected to the tax arrangements obtaining at the start of the project, the

other by applying in each year the tax laws currently in force.

The data defining the three examples were derived from information actually used in the evaluation of three large mining projects by the RTZ Corporation, simplified and adapted in various ways to allow comparative calculations. Three variables – the length of construction period, the operating life, and the operating year in which peak profits are first attained – strongly influence sensitivity to tax changes, and each project represented a combination of these variables frequently encountered in mining ventures; the values are given in Table 1. The scale of capital expenditure and the method of finance in each case were also fairly representative of comparable projects undertaken by British mining companies in the 1960s. As a rough indication, the proportions of loan finance to total undiscounted capital expenditure were 0.53, 0.67 and 0.38 respectively, with repayments to be completed in years 17, 7 and 17 from the start of construction.

TABLE 1
Characteristics of projects

Project	Construction period (years)	Operating life (years)	Peak profits (operating year)
A	4	15	3rd
B	2	20	4th
C	6	25	4th

The years in which each project was finally evaluated and construction of mining works began was taken as 1948 (in place of the various later dates for the underlying 'actual' projects). The tax information used relates to the actual arrangements in force during 1948–1969, a period long enough to cover the estimated lives of projects A and B and most of C's life; for the remaining years of project C the tax rates used were those for 1969. In order to compare

the effects of various tax environments, the British, Irish, Australian and Canadian systems were applied in turn to each project. All results presented here are based on a discount rate of 10%, although calculations have also been carried out for other rates. Net present values relate to estimates of total cash flows based on the price level of the initial year, after interest and all corporate taxes, and taking account of all allowances, grants and tax holidays.¹

Results and Conclusions

The net present values calculated for each mine are set out in Table 2, while Table 3 gives the difference between the net present values based on 'constant' and 'variable' tax regimes as a percentage of the former. These percentages give a crude but striking measure of the error incurred by ignoring the variation of tax arrangements over time.

TABLE 2
Net present values

		UK	Ireland	Australia	Canada
<i>Project A</i>	Constant	25.60	41.31	59.49	65.44
Taxes					
Actual		29.81	67.70	53.59	61.21
Taxes					
<i>Project B</i>	Constant	11.78	43.43	65.90	69.19
Taxes					
Actual		15.14	68.81	56.36	53.82
Taxes					
<i>Project C</i>	Constant	3.97	7.81	12.99	13.89
Taxes					
Actual		2.16	11.56	10.83	11.09
Taxes					

TABLE 3
Percentage deviations of 'Actual tax' from 'constant tax' NPVs

Project	UK	Ireland	Australia	Canada
A	+16	+64	-10	-6
B	+29	+58	-14.5	-22
C	-46	+48	-17	-20

ACCOUNTING AND BUSINESS RESEARCH

These Tables suggest that it would be most useful – despite the obvious difficulties – to attempt prediction of fiscal policies, possibly in terms of probabilities, and to use these systematically in project appraisal. In this connection, it is sometimes suggested that an escalation factor for tax rates should be introduced into the calculations. However, tax changes during the period considered in our study have not always reduced project values. In Australia and Canada, corporate tax rates did increase, while the effects of other aspects of the tax system on mining remained largely unaltered. In Ireland, the upward trend in corporate tax rates was overshadowed by the introduction of a nine-year partial exemption scheme for mining profits. In the UK, all tax arrangements were subject to considerable fluctuations throughout the period; these produced significant increases in the values of projects A and B, while the value of C decreased largely because of the suspension of initial allowances for capital expenditure in 1952/1953. These results illustrate the importance of paying attention to all aspects of a country's 'fiscal bundle', not merely to the rates of taxation. They show also that the sensitivity of a project's value to specific fiscal instruments depends critically on its particular pattern of cash flow generation. It is an obvious, though important, conclusion that attempts to incorporate the effects of possible fiscal changes into sensitivity or probability analysis must rest on a careful assessment of the types of possible changes in relation to the special characteristics of the project under consideration.

Acknowledgement

The work reported here forms part of a programme of research into problems of risk in corporate finance and project evaluation, which is being undertaken by members of the Group Planning Department of the Rio Tinto Zinc Corporation under the direction of L. P. Foldes, Reader in Economics in the University of London. A. J. H. Orhniel, now senior lecturer in Economics at Kingston Polytechnic, was employed by RTZ during 1970–71 to work on aspects of the research connected with taxation. The authors are indebted to RTZ for financial support, and to many of its members for valuable discussions and help.

¹In calculating the 'actual tax' net present values, it was assumed that contracts for construction expenditure were finalised in the year in which the expenditure was incurred.

The Lease Evaluation Solution: A Comment and Alternative

John R. Grinyer

Introduction

Mr. E. C. Bloomfield and Professor Ronald Ma have presented an interesting paper on the evaluation of the leasing decision¹ which, in my opinion, advocates a fundamentally incorrect solution. Given their assumptions their analysis is, of course, correct, but this paper challenges a basic assumption, on which their model relies, concerning the definition of the appropriate stream of cash of the finance alternative to the lease. It contends that an alternative definition is available which is more appropriate than theirs, and removes the need to use the cost of equity for discounting debt financing opportunities, which cost is unlikely to be a correct rate given the different risk characteristics of financing and operating flows.²

The Bloomfield-Ma Model

It may prove helpful if we briefly review the Bloomfield-Ma model. Their main assumptions were:

1. Analysis is to be made by reference to ordinary shareholders' interests, which are served best by maximising the market value of the currently outstanding shares.
2. Share price is a positive function of expected cash flows accruing to shareholders and a negative function of the rate at which those flows are capitalised in the market, i.e. the cost of equity capital.
3. The cost of equity takes account of both business and financial risk.

4. The firm maintains a target gearing ratio, but minor variations in the ratio over time resulting from the irregular nature of financing issues does not affect the cost of equity.

5. The investment project associated with the lease is acceptable on a conventional net present value calculation using the weighted average cost as a criterion rate, and its acceptance would not change the business risk of the firm.

6. The firm believes that the addition of fixed charges under a lease would be viewed by the market in the same light as equivalent fixed charges arising from new borrowings, and that acceptance of the lease or a borrowing alternative would not affect the firm's equity capitalisation rate.

Assumptions 1 to 5 are fairly standard and will not be discussed in this paper. Assumption 6 is necessary to the Bloomfield-Ma analysis and is retained in this paper. Their analysis proceeds to identify the total cash flows associated with leasing an asset as

$$\sum_{t=1}^{T-1} Y_t - L_0 (1-a) - \sum_{t=1}^{T-1} L_t + \sum_{t=1}^{T-1} (O_t (1-a) - aD_t) \quad (1)$$

where Y_t = net cash flows, after taxes, expected from operating the asset in period t .

T = number of periods in which the asset is expected to generate revenue.

L_t = the *contractual* payment under the lease at time t .

a = the company tax rate, at this point it is assumed that payment of tax is not lagged, but lags are easily included.

O_t = operating expenses arising with the purchase option, in period t , which

¹E. C. Bloomfield and Ronald Ma, 'The Lease Evaluation Solution', *Accounting and Business Research*, Autumn 1974.

²See, e.g., R. W. Johnson and W. G. Lewellen, 'Analysis of the Lease or Buy Decision', *Journal of Finance*, September 1972 and Myron J. Gordon, 'A General Solution to the Buy or Lease Decision: a pedagogical note', *Journal of Finance*, March 1974.

will be avoided under the lease.

D_t = depreciation allowances for tax purposes not obtainable under the lease.

Following assumption 6 above, Bloomfield and Ma reason that the lease is equivalent to borrowing, and the specific borrowing alternative would be one which gave rise to the same stream of *contractual* payments as under the lease for periods 1 to T. This is the vital assumption which leads to equation 4 below by the steps.

- (a) determine the notional amount borrowed (M_0) using equation 2

$$M_0 = \sum_{t=1}^{T-1} \frac{L_t}{(1+r)^t} \quad (2)$$

where r is the rate at which the firm can borrow and other terms are as previously defined.

- (b) set up the cash flow on the borrow and purchase alternative to the lease, as in 3

$$\begin{aligned} & \sum_{t=1}^{T-1} Y_t + M_0 - C_0 - \sum_{t=1}^{T-1} B_t + \\ & a \sum_{t=1}^{T-1} I_t \end{aligned} \quad (3)$$

where I_t is the interest payment in year t .

C_0 is the cash purchase price of the asset

R_t is the repayment of principal in year t

and B_t is repayment of principal and interest in year t such that $I_t + R_t = B_t$

It is apparent from expression 3 that the cash flows assumed for the financing alternatives are fundamentally different because of the different tax reliefs arising under leasing and borrowing arrangements. Elimination of common elements from expressions 1 and 3, and comparison of those expressions, enables a value of the leasing opportunity to be calculated, i.e.

$$\begin{aligned} \Delta V = & -L_0 (1-a) + \sum_{t=1}^{T-1} \frac{a(L_t - I_t)}{(1+k_e)^t} + \\ & \sum_{t=1}^T \frac{O_t(1-a) - aD_t}{(1+k_e)^t} - M_0 + C_0 \end{aligned} \quad (4)$$

in which k_e is the cost of equity capital and is used because Bloomfield and Ma argue that the difference between the alternative financing flows assumed must be a benefit or cost to equity holders, so that the equity cost is the appropriate discount rate. Such an

ACCOUNTING AND BUSINESS RESEARCH

argument is heavily dependent on their assumption that the equity cost is insensitive to changes in gearing and would be questioned by many informed readers. The problem, in this form, disappears with the alternative approach proposed in this paper, and will not therefore be pursued here. Equation 4 is not in the original paper, but is the difference between expressions 6 and 7 in that paper and contains the essence of the approach advocated in it.

An Alternative Approach

The treatment of a lease as a financing alternative to debt seems sensible, because it has many of the characteristics of debt. Leasing involves the acceptance of a contractual liability to pay a defined stream of cash, over time, in order to obtain the services of an asset. If the firm borrows to purchase that asset the transaction could be described in exactly the same terms. The effects of leasing and borrowing are likely to be different in their impact on the patterns of accounting profits and of tax payable over time, but both create a contractual outflow of cash, with associated taxation generated cash flows, which have the effect of increasing the variability of the residual stream of cash generated by operations and of increasing the risk to the firm because of the similar consequences which could arise from failure to provide the agreed outflows.

It could be argued that leasing increases gearing primarily because of its effects on residual cash flows, and that it is with cash flows that our analysis should be concerned. In setting up their borrowing alternative to a lease Bloomfield and Ma clearly acknowledged the similarity between leasing and borrowing. They, however, emphasised the *contractual* payments aspect, and ignored the taxation generated associated cash flows, in setting up an equivalent stream of cash to be discounted to year zero in finding the amount borrowed (M_0). Their approach seems, at least to the author, to be in error because the comparison should correctly be made between the alternative sets of *cash* flows implicit in the financing alternatives, and such cash flows are likely to include taxation elements in addition to purely contractual ones.

Assume that leasing is viewed, by the market, as a form of debt and that gearing is measured by reference to expected cash flows rather than asset cover. Also assume, with Bloomfield and Ma, that the firm has a target gearing ratio, then the adoption of a lease will reduce the opportunity of raising debt and leasing and borrowing are clear alternatives. The preferable alternative is the one under which the firm can borrow at least cost, so it would need to compare the cash flows arising under each alterna-

tive. Taking all cash flows into account, and assuming that the after tax cost of debt (i) is the appropriate discount rate, then the present value (G_0) of the outflows which would arise with the lease can be calculated

$$G_0 = \sum_{t=0}^T \frac{(L_t - O_t)(1-a) + aD_t}{(1+i)^t} \quad (5)$$

The cash flow $(L_t - O_t)(1-a) + aD_t$ may be regarded as subject to greater uncertainty than the payment of an equivalent amount under a loan, i.e. $R_t + I_t - aI_t$. Expenses borne by the lessor, O_t , are likely to be variable and the tax rate could also vary over time. The increased variability may imply to the market higher risk to the shareholders than is usually associated with the rather more stable stream of outflows generally arising under borrowing arrangements, with the result that the cost of equity capital changes to reflect the fact (which would indicate an unrecognised imputed cost of the leasing flows). If the reader thinks that the market will regard the flows in equation 5 as being more risky than those of debt, and that he can quantify the change in the market value of equity resulting from adoption of the lease, then he could easily adjust the figure G_0 to take account of the expected change in market value without changing the discount rate ' i ' used in calculating that figure. A possible approach is outlined below,³ but it seems likely that management will consider that it is not possible to make the required estimates with sufficient accuracy to justify the exercise, for even if the necessary adjustment could be estimated with adequate accuracy it might be immaterial in amount, because it seems likely that O_t and 'a' are less variable than Y_t (i.e. the project net cash flows) assuming the absence of major changes in the system of taxation. We proceed on the assumption that an unadjusted after tax debt rate is the most suitable one to use for the evaluation of the lease or borrow decision. It is interesting to note that other writers, e.g. Modigliani and Miller

who suggested its use for discounting tax shields arising from debt finance,⁴ have suggested similar rates for discounting cash streams of not dissimilar apparent risk.

G_0 in equation 4 is the notional amount which could be borrowed for the same after tax cash flow as is associated with the lease. Leasing saves the payment of the cash price C_0 , so that that sum is the effective amount borrowed under the lease. Comparison of G_0 with C_0 now shows whether or not the lease is an advantageous form of financing. If $G_0 > C_0$ the lease is advantageous and if $G_0 \leq C_0$ it is acceptable or advantageous on purely financial grounds.

The same conclusions can be derived using the analytical approach adopted by Bloomfield and Ma, as is shown below.

Flows associated with leasing and operating an asset are assumed to be as shown in equation 1a, which is a modified form of expression 1. Note that L_t can be zero in year T , e.g. as assumed in the Bloomfield-Ma model.

$$\begin{aligned} & \sum_{t=1}^T Y_t - L_0(1-a) - \sum_{t=1}^T \\ & ((L_t - O_t)(1-a) + aD_t) \end{aligned} \quad (1a)$$

The notional debt alternative is now

$$M_0^* = \sum_{t=1}^T \frac{((L_t - O_t)(1-a) + aD_t)}{(1+i)^t} \quad (2a)$$

and the borrow and purchase alternative is therefore

$$\begin{aligned} & \sum_{t=1}^T Y_t + M_0^* - C_0 - \sum_{t=1}^T \\ & ((L_t - O_t)(1-a) + aD_t) \end{aligned} \quad (3a)$$

Taking the difference between the alternatives, i.e. subtracting expression 3a from 1a, provides the differential flows arising from the leasing alternative, as shown in expression 4a.

$$C_0 - M_0^* - L_0(1-a) \quad (4a)$$

but $M_0^* - L_0(1-a)$ is the present value,

$$\sum_{t=0}^T \frac{((L_t - O_t)(1-a) + aD_t)}{(1+i)^t}$$

of the leasing flows discounted at ' i ', i.e. G_0 of equation 5, so 4a leads to equation 12.

$$G_0^* = G_0 + \Delta V_s$$

where, for example,

$$\Delta V_s = \sum_{t=1}^{\infty} \frac{C_t^*}{(1+e_2)^t} - \sum_{t=1}^{\infty} \frac{C_t}{(1+e_1)^t}$$

in which G_0^* is the adjusted figure of G_0 . ΔV_s is the change in the market value of the total equity in the firm as a result of the changed risk associated with lease rather than debt financing.

C_t^* is the total dividend flow to shareholders at the end of period t , excluding the flows associated with the finance decision.

e_1 is the cost of equity capital with debt finance.

e_2 is the cost of equity with the lease finance.

³F. Modigliani and M. H. Miller, 'Corporate Income Taxes and the Cost of Capital: a correction', *The American Economic Review*, June 1963.

$$\begin{aligned}\Delta V &= C_0 - \sum_{t=0}^T \frac{((L_t - O_t)(r-a) + aD_t)}{(r-i)^t} \\ &= C_0 - G_0\end{aligned}\quad (12)$$

where $\Delta V \geq 0$

if $C_0 \geq G_0$

and is negative if $C_0 < G_0$

The financial analysis favours acceptance of the lease if ΔV is positive, which provides the decision rules already outlined above.

In the above analysis leasing is viewed as an alternative to debt which would otherwise have been issued in achieving the target ratio. The crucial assumption is that leasing is viewed by the market as an alternative to debt with equivalence being established on the basis of the after tax cash flows arising under each alternative, which assumption may be the most realistic available at present. If this assumption is accepted there remain no differential cash flows between the lease and debt alternatives considered, so that the equity holders' rate has no part to play in the evaluation of financing by borrowing or leasing.

The analytical approach proposed in this paper can be summarised as follows:

(a) Identify all of the cash flows associated with the considered lease, including those arising from gains or losses of tax reliefs.

ACCOUNTING AND BUSINESS RESEARCH

(b) Discount the cash flows at the after tax cost of the borrowing alternative, on the assumption that leasing reduces the firm's gearing capacity because it creates prior claims on the firm's after tax cash flows and is therefore a direct alternative to borrowing.

(c) The effective inflow from the lease borrowing opportunity is the saving of the purchase price. Compare the present value under 'b' with that price, if it is greater the lease costs more than the borrowing alternative, if less the lease costs less and should be accepted on financial grounds. The size of the difference provides information on the value of the leasing opportunity.

A Numerical Example

Is there any practical significance in the difference between the views expressed in this paper and those of Bloomfield and Ma? Consideration of the practical example which they provided shows that there is. Their illustration was as follows.

A firm can buy a computer for \$1,600,000 or lease it at a saving of \$40,000 per annum in maintenance costs during the first five years. The residual value at the end of five years is estimated \$300,000, depreciation for tax purposes is 15% (straight line) and corporation tax is 50%. There is a one year lag in tax relief. The firm can borrow at 8% (an after

TABLE 1
Cash flows associated with lease finance

	<i>Years</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
(a) Lease payments		\$ -500	\$ -500	\$ -400	\$ -400	\$ -300	\$ —	\$ —
(b) Sale proceeds foregone		—	—	—	—	—	\$ -300	—
(c) Expenses borne by lessor		—	+40	+40	+40	+40	+40	—
(d) a + b - c		-500	-460	-360	-360	-260	-260	—
(e) Capital allowances (depreciation) cost		—	240	240	240	240	340	—
(f) Net expenses allowable for tax		500	220	120	120	20	-80	—
(g) Tax shield at 50%		—	+250	+110	+60	+60	+10	-40
(h) Net before tax flows - 'd' above		-500	-480	-360	-360	-260	-260	—
(i) Net cash flows		-500	-210	-250	-300	-200	-250	-40
(j) P.V. at 4%		-500	-201	-231	-267	-171	-205	-32
(k) Total present value of net cash flows			\$ 1,607,000					
(l) Cash purchase price			1,600,000					
(m) Net disadvantage to leasing			7,000					

tax rate of 4%) and the lease payments are:

<i>End of year</i>	<i>Lease payments</i>
0	\$ 500,000
1	500,000
2	400,000
3	400,000
4	300,000

The cash flows arising because of the lease are shown in Table 1, together with the calculations of the value of accepting the lease. On the basis of the figures the firm should not lease the computer, so that the outcome of the analysis is the same recommendation as was suggested by Bloomfield and Ma. The calculations involved are, however, simpler and less arbitrary than are those proposed by them. It appears that the differences between the approaches are significant, from a practical point of view, because the advantage shown for borrowing in their calculation was a present value of approximately \$32,000 compared with the \$7,000 in Table 1. Clearly

an increase of only \$10,000 in purchase price would have led to differing recommendations.

Conclusion

This paper proposes an alternative to the analytical model suggested by Bloomfield and Ma, which it claims is more appropriate for decision purposes because it is based on a model of the borrowing alternative to leasing which better reflects the approach which the market should logically adopt to gearing. It has the additional advantages of being simpler to understand and operate. Illustration of the proposed approach using the Bloomfield-Ma example indicated that the analytical methods can provide different recommendations.

The major difficulty with the outlined proposal is the choice of the appropriate discount rate for discounting *all* of the cash flows associated with leasing. With the existing state of knowledge it seems likely that the after tax borrowing rate is the most appropriate one to use.

Book Reviews

Profit Measurement: Alternatives to Historical Cost. Graeme Macdonald. Accountancy Age, 1974, pp. 132 + xiii. £4.80 hardback, £2.50 paperback. The central concepts of this book will be familiar to those students of accounting who have been nurtured on the well-known works of Bonbright, and Edwards and Bell, and on the thoughts of Irving Fisher, Lindahl, Hicks, Kaldor and others reprinted in the valuable collection edited by Parker and Harcourt. More recent inspiration has been drawn from Baxter and Wright.

The author's central thesis, if I have interpreted it correctly, can be summed up as follows: (1) financial accounting reports are primarily for shareholders; (2) shareholders are primarily interested in dividends and in share values that themselves depend upon dividend expectations; (3) the income section of accounting reports should therefore be designed so as best to indicate the prospects of future dividend flows; (4) since the future is involved there must be subjectivity, but there should not be too much; (5) cash flow forecasts of the whole future of the business, and present value estimates based on these, are in general too subjective; (6) a compromise is therefore necessary and can be obtained by adopting a concept

of income directed towards a future which is limited to a continuation of present activities.

This reasoning leads to a measure of income similar, if I am not mistaken, to that advocated by Gynther. Income is defined as the surplus of gross revenue that remains after provision for capital maintenance, and the latter is defined as the maintenance of the same capacity to produce the physical goods or services as existed at the beginning of the relevant financial period. The estimate of this capacity is made at the end of the period and is therefore based on hindsight. Differences between the re-estimated opening balances and the figures previously taken into the accounts are treated as prior year adjustments or (where prices have changed) adjustments to capital maintenance reserve.

Income thus defined has the following characteristics: (a) the capital heritage at the end of the period is based on a variant of deprival value, that is, on replacement cost or, if lower, the higher of present value in present use and net disposable value; (b) the opening capital value is based on the same concept of deprival value, calculated as if the information available at the end of the period had been available at the beginning. Replacement cost in this context is

what might be called 'prudent replacement cost': it assumes the acquisition of replacement assets that would produce the same goods and services - 'service potential' in the author's words - as before; whereas the more extended, and economically more relevant, definition would relate replacement cost not to a particular mix of physical products, but to the generation of the same cash flow or benefit flow series as before. This means that in the author's scheme the estimate is likely in general to be more objective (since presumably more is known about the current cost of the existing production mix), but is also less relevant as an economic indicator, being based on a physical rather than an economic measure of capital maintenance.

It also follows that income in this scheme is not expressly related to absolute betterment of the shareholders' (or anyone else's) position. As the replacement cost of specified goods and services at present in production is more likely to have relevance for the future than the historic cost of the same, the author's approach seems likely to provide a better measure of operating success, as he claims, than existing accounting methods. His income measure would, however, still be much less than ideal as a means of comparing the relative success of different companies, since it excludes real holding gains and, perhaps more important, is not directed towards the measurement of changing net worth. (The latter, however, may be an unattainable ideal so far as financial reporting is concerned.) The author does not deal to my satisfaction with the difficult and important problem of aggregation: does one take deprival value of the group of assets as a whole, and if not how does one deal with the problem of complementarity?

The author sees no reason why the balance sheet figures should be the same as those used in the calculation of capital maintenance for his income measurement and argues, not unreasonably, that to insist on such a result is to make double entry the master instead of a useful servant. He argues for what may be called the 'best net disposable value' as a suitable, and reasonably objective, base for the balance sheet valuation, pointing to the economic relevance of the transfer value of the assets.

It will be clear from the above that the author has interesting and cogent ideas to press. Some readers may question whether his thesis could have been conveyed in fewer words and whether he need have used as much space as he has on the discussion of matters already well aired in the literature, notably in some of the writing referred to above.

I have some reservations about the style and organisation of material and I would hazard a guess

that the book was written in haste. I had to work hard to build up the general interpretation I have attempted - I hope correctly - above.

H. C. Edey

Economic Analysis and the Multinational Enterprise. J. H. Dunning. George Allen and Unwin (London 1974), pp. 405. £6.50.

There seems to be a trade-off in academic research between the intrinsic importance of a problem and the likelihood of finding a solution to it. Important questions tend not only to be large and complex but also to have a disarming tendency to become even larger and more complex as research progresses. The economic role of the multinational enterprise is just such a subject. Its importance is beyond question; about a fifth of the free world's production is in the hands of multinationals, some of which are themselves larger, economically speaking, than middle sized nations. The growth and prosperity of many nations, and not just the less developed ones, is critically tied to a relatively small number of multinational enterprises. Yet the necessary research into their impact on the welfare of both host and parent countries is extraordinarily difficult.

Research has, of course, been going on in this area for quite a long time but until fairly recently it was mostly very descriptive. However, in the last few years there has been something of an explosion of more analytical (one hesitates to say more serious) studies. Apart from the sheer volume of this, considerable though it is, the problem for the student, or indeed for the researcher is that the subject now involves so many widely different fields. It ranges, for example, through the highly technical areas of trade theory, econometrics, welfare and the theory of the firm, the more practical areas such as industrial organisation, development policy and trade policy; but also it draws heavily on substantially non-economic matters of sociology and international politics. Obviously it would be impossible for any one person to survey competently the whole lot so this book attempts, as the next best thing, to get a team of internationally distinguished authorities each to survey their own part of the field. Even so it is an enormous task and the reader is bound to find areas that have been left out.

In the first place the book only sets out to cover the economic aspects of the problem and in particular each one of the contributors addresses himself primarily to the question of how far the established methods of economic analysis are appropriate for studying multinational enterprises. Thus, for example, the vexed question of comparative international accounting practices is not specifically discussed.

While obviously this is only peripheral to economic analysis some discussion would have been most welcome. After all the economists working in this area not only have a great deal of experience in trying to make sensible international comparisons using corporate data but also they have faced, rather directly, the important theoretical questions of what one is trying to measure and why.

Perhaps a stranger omission from the book is that there is no chapter on the theory of business finance in relation to the multinational enterprise. Several authors do *en passant* discuss problems related to financing such as capital structure and the cost of capital but there is no integrated survey of what difference it does or should make to optimal financing if a multinational raises finance and even has its shares quoted in some or all of its host countries. However, enough of what the book does not contain, because it is in fact quite long and, for the most part, what it does contain is very good indeed.

The book is introduced by its editor, John Dunning, with a paper entitled 'The distinctive nature of the multinational enterprise' and it concludes with another paper by Dunning. In this he returns to the initial theme of whether multinationals are different because of some essential 'multinationalness' or simply because they are typically very large and internationally diverse. If they are just large and diverse then there is no particular reason why appropriately modified but otherwise familiar methods of economic analysis cannot cope. On the other hand if there is more to the difference it follows that naively extending traditional models could be downright dangerous. Dunning's conclusion and indeed that of most of the other contributors is the comfortable one; that is, you can go a very long way using the traditional tools.

In between the two Dunning papers are twelve others surveying different aspects of the subject. The first, and perhaps the most disappointing, is by Thomas Horst on 'The theory of the firm'. This, apart from being somewhat superficial in its treatment of several rather familiar theories, leaves out altogether some probably more fruitful recent developments using financial, stochastic and dynamic models. Horst is followed by a long, immensely thorough and detailed paper on 'The determinants of investment' by Guy Stevens. This in turn is followed by one of the most central issues 'The location of economic activity', which is tackled by Raymond Vernon with his customary breadth and good sense. Richard Caves and Edwin Mansfield respectively do no less justice to 'Industrial organisation' and 'Technology and technological change'.

The remainder of the papers move steadily further

away from the firm with W. Corden and George Borts providing complementary papers on 'The theory of international trade' and 'Long run capital movements', and Geoffrey Maynard a singularly readable account of the implications of multinational enterprises for 'Monetary policy'. Paul Streeten covers 'The theory of development policy' and Constantine Vaitsos, in a paper as long and thorough as Stevens', considers 'Income distribution and welfare considerations'. This leaves two papers both of which are a little unusual and yet particularly interesting. Sune Carlson is concerned about 'Wage determination and collective bargaining' and whether one might expect multinationals to pay higher wages than their national competitors. His conclusion is that the problem is a good deal more difficult than one might at first expect! Charles Kindleberger's paper is called 'Size of firm and size of nation' and strictly speaking that is what it is about; yet it is also a thought provoking mixture of economics, politics and organisation theory that somehow defies summary in a phrase. It deserves to be read by everyone interested in multinationals and probably also by a great many other people who are involved with large corporations.

In summary this book has faults and in particular omissions, that were perhaps inevitable, but in general the editor is to be congratulated. He has brought together a formidable array of contributors and more remarkably has managed to keep them all more or less to their brief. The result is a collection of surveys (complete with an extensive bibliography and an excellent index) which will be invaluable to all researchers in this field. Undoubtedly it will become required reading for every postgraduate student who wishes to challenge this huge and fascinating subject.

M. J. Barron

Accounting and Human Behaviour, by Anthony Hopwood (Accountancy Age Books), 215 plus xiv pages. Price £4.80 (hardback); £2.50 (paperback). Mr. Hopwood disclaims any intention of supplying easy solutions to accounting problems and says that those who do, 'savagely misuse the value of the social and behavioural sciences. For rather than offering instant illumination and speedy solutions, most social scientists have aimed to help their fellow citizens to intelligently understand, appraise and improve their own conditions . . .' (pp. xiii-xiv). Modesty is a great virtue, but when one considers the enormous expenditure on behavioural studies undertaken in the English-speaking world, one must wonder why this should be a statement it would seem at all appropriate to make.

It is probably the existence of a body of extremely senior and well-entrenched American behavioural scientists who are very much non-accountants which prevents real progress towards practical solutions. Their effect on scientific dialogue is well caught by this scenario.¹ . . . A pair of discussants speak . . . Each discussant begins by saying "It is great that accountants have begun paying attention to really important problems, that is, the human behaviour problems with which I am concerned. Unfortunately, I do not know anything about accounting . . . But there are a lot of methodological problems with this study . . ." The two discussants spend an hour very politely tearing apart the study's methodology. Then a young guy, who is probably doing his first study . . . tries to respond . . . "You're right, you're right; I'll try to do better next time; and I'm really sorry I am here!"' Certainly these lads see themselves as the priests of a sacred 'methodology' which is most impressive - so long as no one says the emperor's stark naked; the author lists most of them and describes their general approach(es) well enough. Your reviewer was surprised he does not refer to the exchanges between Stedry and Becker and Green over such marvels as the difference between 'aspiration' and 'hope'; these papers capture the bitchiness of this section of academia.

They also underline the North-Americanism of accepted wisdom in these matters - the conflicting 'authorities' quoted in the exchanges in fact contrasted European and American experience. The author cites another instance (p. 34) where the work of Goldthorpe on the Luton car-workers shows how wrong McGregor and Herzberg can be! The opening chapters of the book discuss 'control' and the behavioural implications of budgeting - participation, feedback of performance and rewards and censure. Hopwood (p. 77) draws attention to the authoritarian assumptions which underlie much of what is written about 'participation'. This is as far away from the idea of 'shop-floor democracy' as can be conceived, but American behavioural scientists seem unaware that what they describe is the methodology for involving front-line management in decisions which have already been taken at a higher level.

Maybe the problem underlying the practical application of behavioural science in accounting is that we cannot accept that we are also funny tribesmen with exotic beliefs and customs. The stronger our culture the more compelling and comprehensive is its pattern of fixed ideas. Anthropologists speak of 'emic' (insiders) and 'etic' (outsiders) views; our ideas about accounting enshrine our tribal concepts

ACCOUNTING AND BUSINESS RESEARCH

of 'value' so it is hardly surprising that an attempt to take an etic view of one's own tribal values is an exercise which few experiment with in their real life activities.

This may be what makes the author pessimistic about whether the techniques of accounting can be extended to the resolution of behavioural problems; it would seem that Hopwood at least feels convinced that accounting can never be really at home outside the realm of objective phenomena. Against this he seems able to recognise the possibility of a 'functional understanding' of accounting, when a person 'might not be able to give a precise description of how or why, but he may be able to use the accounting system for his own advantage' (92). No one with industrial experience could doubt the fact that almost everybody is a good 'accountant' - inside his own skull if not on paper. Chapter 7 makes a similar point, with its emphasis on cultural *interpretation* of accounting reports; not only is unwelcome material not recognised, but also the decision-maker uses other data which he gathers from non-accounting sources - in short we all possess a mazeway or Weltanschauung. Tony Hopwood is to be congratulated on including the work on Stock Market reaction to accounting reports (the efficient market hypothesis and all that) in behavioural aspects of accounting. Your reviewer is grateful also for the reference to the B. F. ('The Box') Skinner paper on 'Superstition in the Pigeon'; who can doubt that the *human* reaction to uncertainty is also 'magic, superstition, ritual and myth' - the essential irrationality of so much financial 'conventional' wisdom?

Is the book a 'good buy'? Some might feel that it does not always go into the detailed arguments of the voluminous material it cites in sufficient detail for postgraduate work. The author does not specify his intended readership, but your reviewer believes it would be a useful text for a senior undergraduate course in this area, providing a very necessary link to a selection of 'readings from the masters'.

Trevor Gambling

¹William Starbuck 'Comments: Performance Measurement and Incentive Alternatives in a Multivariable Setting'. *Behavioural Experiments in Accounting*, Thomas Burns (ed.) (Ohio State University), 1971, p. 458; this quotation also appears in 'The Report of The Committee on the Relationship of Behavioural Science and Accounting', *The Accounting Review* (Supplement to Vol. XLIX, 1974), p. 127-139. This report is most interesting, in that it advocates that no one should dare to write about behavioural accounting except in terms acceptable to behavioural scientists - without requiring a similar courtesy in the reverse direction!

Contributors to Accounting and Business Research

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Contents

Asset Valuation with Imperfect Markets	Michael Bromwich	242
Corporate Modelling: When Success Can Be a Long-Term Forecast	J. R. Precious D. R. Wood	254
Accounting Standards: A Blind Alley?	Colin J. Jones	273
Accounting Information: An Investigation of Private Shareholder Usage	T. A. Lee D. P. Tweedie	280
Holding Gains and Long-Term Liabilities A Rigorous Analysis	John R. Grinyer	292
Some Aspects of the Cost of Debt	Simon M. Keane	298
Capacity Measures and Financial Accounting	Harold Bierman	305
Empirical Research into Information Utility and Acceptability: A Reply	J. Fisher	309
Book Review		314
Notes on Contributors to this issue		319



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Asset Valuation with Imperfect Markets

Michael Bromwich

Much of the discussion concerning asset valuation and income measurement in published accounting reports has assumed or advocated that the present value of the cash flows expected to be generated by an entity's set of assets considered as a whole represents an ideal valuation of the entity, at least, when optimal decision making by investors is the objective in mind. This valuation is also seen as an essential element in the derivation of what is normally called the 'economic' income of a period, which requires a comparison of an entity's present value at the beginning and end of the time period under consideration.¹ The selection of this valuation base rests on the well known argument that if investors are to make optimal choices between investments they require knowledge of the quantity and risk quality of the cash flows expected to be generated by each decision alternative. These are the variables on which the present value valuation model is founded.² However, use of this valuation system in accounting reports is normally held to be impracticable (and, perhaps, unwise) for its underlying subjectivity infringes contemporary standards for the verifiability (objectivity) of published accounting statements. The use of the present value model is, therefore, relegated in the literature to aiding in the selection of more practically acceptable valuation systems, such as those based on the replacement cost or net realisable value of the entity's assets, to serve as its surrogates.

Many authors have suggested that the current

market value of the assets of a firm could play this latter role.³ Even those writers who have been critical of the surrogate thesis seem to accept, at least implicitly, that there might be a case for using these current values in situations of perfect markets in equilibrium,⁴ for it can be demonstrated that with the usual perfect market assumptions⁵ and with markets in equilibrium, the net realisable value and replacement cost valuation models (NRV and RC models respectively, henceforth) will for a given asset, yield identical results to that obtained using the present value model (PV, henceforth).⁶

A less rigorous explanation of this relies first on the perfectly competitive market assumption of complete resource mobility which implies that any super profits will be competed away by new entry. All

¹Probably the most well known statement of this view is that of Donald A. Corbin in 'The Revolution in Accounting', *The Accounting Review*, (Oct. 1962) p. 630.

²See for example, L. Revaine, *op. cit.* and H. C. Edey, 'Deprival Value and Financial Accounting' in H. C. Edey and B. S. Yamey (eds.) *Debits, Credits, Finance and Profits*, Sweet and Maxwell, 1974, esp., p. 77.

³A list of these assumptions usually contains, at least, the following

- (i) each individual's activities in the market are of a scale not sufficient to affect the market price.
- (ii) there exist no artificial constraints on demand, supply or prices and there are no transaction costs or taxes.
- (iii) freedom of entry and exit into all industries exists for all individuals and resources are perfectly and instantaneously mobile and adaptable.
- (iv) all actors have identical expectations as to the returns from capital assets and are equally aware of all opportunities currently available in the market.

For a discussion of these assumptions see, e.g. K. J. Cohen and R. M. Cyert, *Theory of the Firm: Resource Allocation in a Market Economy*, Prentice-Hall, 1965, pp. 49-51.

⁴Such a demonstration could follow that used by L. Revaine to establish the equivalence of the PV and RC income models in these conditions: see L. Revaine *op. cit.* pp. 95-100.

¹For two oft-quoted examples see, E. O. Edwards and P. W. Bell, *The Theory and Measurement of Business Income*, University of California Press, 1967, Chapter II and American Accounting Association Committee on Accounting Standards, 'Accounting and Reporting Standards for Corporate Financial Statements, 1957, Revision', *The Accounting Review*, (Oct. 1957), especially p. 538.

²See L. Revaine, *Replacement Cost Accounting*, Prentice-Hall, 1973, Chapter 4 for a detailed exposition of the arguments summarised in this section of the article.

holders and potential holders of assets will, therefore, in market equilibrium expect to obtain a zero net present value from any investment; that is, $I = PV$ for all assets, where I represents for potential holders of the asset the asset's purchase price (RC) and its opportunity cost for existing holders (NRV). Secondly, assets having the same service potential must in perfect markets sell for the same price, irrespective of whether they are traded on the new or second hand asset markets, that is $I = RC = NRV$ for a given type of asset. If this were not the case, profits could be obtained by trading between the two markets and this trading would bring about the equality of prices for identical new and second hand assets. Thus, in the circumstances being considered, the present value of a given asset must be equal to both its replacement cost and its net realisable value, that is, $PV = RC = NRV$. This relationship will hold even if assets have alternative uses for perfect markets will yield asset prices which equate the revenue obtained per pound of capital invested in each use.⁷

Critics of the surrogate thesis argue that the conditions (or imperfections) of the practical world are likely to destroy or distort this identity between the results obtained from the three valuation models. One concludes that '*there is no necessary relationship between current replacement costs of existing assets and their present values*: current replacement costs may be greater or less than the present value of fixed assets.'⁸ Furthermore, critics of the use of current asset values in accounting reports have argued *a priori* that the presence in the real world of market imperfections and disequilibria will cause the present value of an asset to be a function of a large number of factors which affect firms differently and to which firms can adapt only imperfectly. This will cause firms to place different values on identical assets. Further, the market prices of assets may change over time for a large variety of reasons and these alterations may not be reflected by changes in the present values of already held assets.⁹ This type of reasoning suggests to A. D. Barton that 'the present values of a given fixed asset are likely to vary enormously between firms ...'¹⁰

There have been few attempts to support these

⁷K. J. Cohen and R. M. Cyert, *op. cit.* pp. 124-125 and 138-142.

⁸A. D. Barton, 'Expectations and Achievements in Income Theory', *The Accounting Review*, (Oct. 1974), p. 670.

⁹H. J. Snavely, 'Current Cost for Long-Lived Assets, A Critical View', *The Accounting Review*, (April, 1969), pp. 344-353.

¹⁰A. D. Barton, *op. cit.* p. 671.

conclusions by analysing the distortion to the perfect market identity between the PV, RC and NRV of an asset caused by a given market imperfection (defined to include friction) or disequilibrium. This article begins this analysis for a small number of market imperfections and disequilibria. It considers (only) the effect of introducing one imperfection or disequilibrium at a time to an otherwise perfect market. The analysis does not purport to describe the real world. However, it is felt that the rather abstract approach used does allow us to deal with what, otherwise, would seem to be an impossible problem and to derive results having real world significance. It also explores whether any of the impediments to the working of the perfect market have a differential effect on NRV and RC values - a matter which has some bearing on the current controversy as to 'whether or not society is better served by the valuation of assets for public reporting at the cash they command on sale ... or at the cash required to have them available for use by the firm'.¹¹

Only durable fixed assets are considered and it is usually assumed that the service potential equivalent of a currently held asset can be purchased in both the new and second hand asset markets.

The results give substantial support to the critics of the surrogate thesis for the findings suggest that neither of the current value measures considered here (RC and NRV) can, in general, reliably reflect either a given firm's view of the value in use of a given asset(s) or the market's estimate of the earnings of the asset(s) under consideration.

The analysis suggests that at best it is possible to predict only, whether the current value of a firm's assets overstates or understates its net worth. Even this requires a much greater knowledge than is presently available to the public concerning the firm's existing and planned technology and the competitive structure of the market for its output and of that market from which it buys its fixed assets. Finally, the analysis suggests that there are some *a priori* reasons to believe that in some cases RC values may provide a better approximation to the firm's net worth but that NRV will serve better in others. We will

¹¹Norton M. Bedford and James C. McKeown, 'Comparative Analysis of Net Realisable Value and Replacement Costing', *The Accounting Review* (April, 1972), p. 333. The article uses their definitions of the RC and NRV of an asset. RC values are given by answering the question 'what would be the cost today of purchasing assets, having services equivalent to those now held and expected to be used in the least costly form in the markets in which the entity normally trades?' (p. 334). The NRV of an asset is defined as 'the maximum net amount which can be realised from the disposal of that asset within a short period (not a forced sale situation)' (p. 333).

commence the analysis by considering the effects of one type of technological change on the perfect market relationship between the three asset valuation models in the presence of imperfect adaptation by firms.

Alternative technologies and technological change with imperfect adaptation

In this section we will abstract from the problem arising when revenue is produced jointly by a bundle of assets and assume that the assets being considered make an independent contribution to a firm's revenue. (The problem of the jointness of assets in revenue production is taken up in the next section.) In these circumstances the introduction of a new vintage of cost-saving technology into a perfect market should act equally on the PV and NRV of existing assets. There should be a once and for all decline in both these values. These falls should ensure in equilibrium the equality of the net revenue obtained per pound of investment in all vintages of technology, irrespective of whether the investment is in the new or second hand market. Alternatively, we can say that the falls in the values of existing assets will be such as to equate the cost per unit of final output (e.g. capital costs plus operating expenses) from all vintages of technology.

Reporting in the balance sheets the net capital cost of replacement (i.e. the capital cost of replacement less the discounted value of any cost savings or incremental net revenues obtainable from the new technology) may not be what replacement cost advocates have in mind or what existing accounting practice allows. The former normally are considering: 'what would be the cost today of purchasing assets, having services equivalent to those now held . . .'¹² The correct derivation of such a cost requires careful adjustments to capital costs, for to obtain equivalent service from a new technology a firm may have to pay a higher capital cost which it expects to be offset by either higher productivity or a lower direct cost per unit of final output in the future. As a very simplified example, assume that an investment outlay of £10,000 is required to replace a machine having a physical service potential of 1,000 units per year for five years at a variable cost of £1 per unit. Also assume that the new machine although having the same length of life and physical output potential as the machine it is to replace allows the variable cost per unit of production to be reduced to, say, £0.9 per unit. Our reasoning suggests that because of technological progress the replacement cost of the old machine is not £10,000 but rather this less the discounted value of the savings in variable cost. This calculation gives a

replacement cost of £9,621, assuming a discount rate of 10 per cent and that all costs arise at the year end.

Reporting the gross RC prices of already held assets of earlier vintages thus incorporates the incremental benefits expected from the new technology and would, therefore, overstate the present values of existing assets even in a perfect market. This suggests that an investor who attempts to use accounting reports based on gross replacement costs to derive an estimate of a firm's future cash flows, needs information concerning the firm's future replacement plans and the technological vintages of its existing assets.

However, the problem is more serious than suggested above for firms which employ non-optimal technology may be able to continue temporarily to cover their variable costs at the prices reigning in the final goods market. These latter prices would reflect the costs of those employing the optimal technology. Such a temporary continuance of activity may yield such firms a greater net revenue than would selling their assets (probably for scrap) and re-investing the proceeds in the best available opportunity. Indeed, in oligopolistic markets they may be able to soldier on indefinitely.¹³ In this situation the use of even carefully defined equivalent service asset values based on the new technology will overstate the PV of the assets of such organisations for the former imply that the firm has replaced with the new technology.

Resort to NRVs in these circumstances may not give a better approximation to the PV of existing assets. It is in just such situations that market imperfections on the supply side of the asset market may allow the prices of assets traded in the second hand market to capture part or all of the total net cash flows expected from the entire bundle of assets with which those under consideration are to be combined (see the next section). If we abstract from these difficulties the NRV valuation base will in the presence of technological change provide an approximation to the PV of existing assets no worse than that generated by the use of the RC model, because in the context of perfectly competitive markets the NRV of assets will decline to reflect technological changes in the new asset market. Moreover, the use of NRVs frees us from the difficulty of defining equivalent services.

Indeed, the NRV model may provide a better proxy for the PV of existing assets in the face of technological change where the firm either is not able, as

¹²Bedford and McKeown, *ibid.* p. 334.

¹³Only firms using optimal technology will exist in long run equilibrium with perfect markets. However, P. Sylos-Labini has presented a plausible case that several technologies may exist in parallel over a long period in oligopolistic industries, see *Oligopoly and Technical Progress* (translated by E. Henderson), Harvard University Press, 1962.

required by perfect market assumptions, to adapt immediately to the new technology because of technological difficulties and practical constraints or does not wish to because the cost of adjustment outweighs the cost reduction advantages of the new technology. In both these situations unless RC values are adjusted for the likely delays in replacement, RC balance sheets based on the new technology will overstate the present value of cash flows from existing assets. The naive use of RC values will in the case where technological difficulties and practical constraints exist inflate the PV of existing assets by the present value of the incremental cost savings resulting from replacing immediately rather than when actual replacement will occur. In the other situation, where the cost of adjustment is forecast to be greater than any expected cost reduction, RC values based on the new technology will be above the PV of existing assets by the amount that the present value of the incremental adjustment costs caused by deviating from the optimal time of replacement exceed the present value of the gross incremental cost savings from replacing now.

In these two cases the NRV model will in an otherwise perfect and frictionless market better serve the investor who wishes accounting reports to aid him in estimating the net worth of firms than will the naive RC model. Accounting reports based on RC may well be of use in these cases only if detailed information is available concerning the replacement policies of the firms being evaluated. No generalisations of the above type are possible in the real world. Several factors, such as asset specificity and transport and set-up costs, may act to depress substantially the NRV of existing assets below their present value.

Moreover, the possibility of NRV prices and the prices of new assets of the existing type absorbing part of the net cash flows of a set of joint assets arises where some firms are unable to avail themselves of the new technology immediately. This problem may be especially acute where an innovation cannot be easily incorporated into the current technology of some firms. At least two possibilities can be envisaged. The improved technology may be available only to organisations of a minimum size or may require major adaptation expenses by all those not presently utilising a specific technology. In both cases, we would expect the favoured organisations to dominate the market in the long run. RV and NRV reports will easily approximate a firm's net worth only if this restructuring of the industry takes a considerable time, and new assets of the existing type remain available during much of this period. If the aim is to help investors estimate a firm's net worth, NRV and RC values of assets could be used in accounting

reports, provided that these values are chosen carefully from the appropriate sub-market.

It would seem that in real world situations the use in investment decision-making of accounts based on either of the two current value systems requires a great deal of information about the character of the bundle of assets being considered and the firm's future intentions concerning both the replacement of assets and the activity to which they render a contribution. The selection of that valuation base which yields the best approximation to net worth requires this information, but this knowledge alone will not allow an investor to deduce the firm's net worth by making adjustments to the reported figures. The problems become more acute when we allow for disequilibrium, however temporary, in the asset supply market. This matter is examined in the next section but under the assumption of no technological change for relaxing this assumption would compound the difficulties of the analysis.

Short run disequilibria and imperfections in the asset supply market – joint assets and replacement with like technology

We first consider the equilibrium situation. With equilibrium in a perfect market, all firms manufacturing a given product should have the same long-run cost curves. All actors should face the same price for a given bundle of services (if we ignore the effects of transport and set-up costs and asset specificity), irrespective of the market from which the services are to be obtained. No problem of attributing cash flows to individual assets arises with a perfect market in equilibrium – all assets will be traded or held on the expectation that they will earn no more than the going rate of return.

In practice, firms within the same industry employ a variety of technologies and face a range of cost functions generated from different complexes of long-lived assets. Assets in such complexes normally contribute jointly to the production of revenues. In this situation, it is generally held to be impossible to ascribe a stream of future cash flows to an individual asset other than on an arbitrary basis.¹⁴ In disequilibrium situations or with imperfect markets, this merely strengthens our earlier conclusions that neither RC nor NRV prices can be used easily to aid in deducing the net worth of a firm.

The problem of jointness of revenue production in situations of imperfect markets and temporary disequilibria means that few generalisations can be

¹⁴S. H. Penman, 'What Net Asset Value – An Extension of a Familiar Debate', *The Accounting Review*, (April, 1970), p. 345.

ventured even for the firm which is willing to replace all its assets at the going new asset prices or would do so if it were deprived of its existing assets in some mysterious way (with the usual assumption of adequate notice of the need to replace).¹⁵ It might be expected that in this situation the aggregate RC of an entity's assets would either be equal to its net worth or, more likely, be less than this, if only because, with perfect competition, new entry in the asset supply market would ensure that asset suppliers are unlikely (other than in the short run) to capture the super profits of any individual purchaser of assets.¹⁶ Super profits may be earned by asset suppliers in the short run because excess demand in the final goods market allows assets suppliers to exert any market power arising from an imbalance of supply and demand in the asset market. But with our assumption of perfect resource mobility, new entry will compete away any super profits arising in both markets. The aggregate NRV of a collection of assets will tend to be held below its RC by other factors such as asset specificity and transport and set-up costs.

Even this vague statement of the relationship between a firm's present worth and the aggregate RC of its assets is too strong for situations where firms buying in the asset market are not replacing an entire bundle of assets which can be considered as relatively separable in revenue production from the remainder of the firm.

Firms may be purchasing but part of such a set of assets first because of the economic advantages of some of the assets they already hold over those currently available on the market. Secondly, the physical characteristics of some of the existing assets in the bundle may make difficult their adaptation or disposal. For example, a port or railway may not be able to dispose easily of its basic infrastructure even though technological advances have produced more economic replacements.

The well known danger in this situation is that imperfections and disequilibria in the asset supply market may enable asset suppliers to set prices for individual assets which capture part or all of the aggregate net cash flows expected to be generated over the lifetime of a replacement asset by the bundle of joint assets to which it is expected to render a contribution.¹⁷ In extreme conditions, a firm seeking to continue operation in the face of irreparable breakdown of a vital asset would be willing to pay a

price for a replacement up to that which imputes to the replacement all the net cash flows expected to be obtained over its lifetime from the set of joint assets with which it is to be combined. Asset prices which capture part of purchasing firms' joint cash flows are unlikely to bear any clear relationship to the present value of similar assets already held by other firms.

As an extreme example consider a monopolist supplier of railway engines who can practice perfect price discrimination facing a railway company with only two assets, its rails and an engine, which together earn £1,000 a year after meeting all costs. If a replacement engine were required the asset supplier could demand any price he wished, up to that which captured (or imputed to the new engine) the entire cash flows from the railway line over the new engine's lifetime, assuming the rails and the existing engine have no scrap value and that, therefore, the shareholders in the railway could not achieve an alternative return by selling off the company. The RC price of an engine arrived at in this way would have little relationship to the PV of existing engines owned by other firms.

There may be an element of this over-imputation in all prices obtained from the NRV and RC markets, at least in the short run, whenever asset suppliers have monopolistic powers. If such prices do capture a greater part of the net cash flows expected by purchasers to be obtained from a set of joint assets than is required to earn asset suppliers a normal return, their aggregation for any given firm is likely to overstate its net worth. This problem arises because individual asset prices in the market will incorporate part of the joint cash flows expected by the firms actually purchasing assets in the market. Moreover, even if the firm under consideration is earning super profits in the final goods market, there is little reason to believe that any clear relation exists between the element of over-imputation contained in the prices paid for assets by current purchasers and the super profits obtained in final goods markets by other firms. The total value of any set of assets obtained using either valuation basis may, therefore, bear no precise relationship to the aggregate present value of such assets.

However, there are reasons to believe that this problem has been somewhat overstated in the literature, provided that an active set of asset markets exists, and is of limited importance especially with regard to RC valuations. Few *a priori* generalisations are possible but the conditions for over-imputation seem to restrict the problem to the short run except in the presence of chronically imperfect market structures (which are discussed in some detail in a later section). The extent of the difficulty is a function

¹⁵W. T. Baxter, *Depreciation*, Sweet and Maxwell, 1970, p. 32.

¹⁶For a more detailed analysis of this topic in the long-run see the later sections of this article.

¹⁷H. C. Edey, *op. cit.* pp. 79-80.

of the constraints on the ability of existing and potential asset suppliers to respond to market conditions. The problem will be especially acute where temporary market power on the supply side allows price discrimination amongst buyers.

Only where the price of a single asset in a set of joint assets is affected by over-imputation, will the maximum RC value of the whole set of assets be exactly equal to that set's net worth. In our extreme example, the RC of the railway engine will be equal to the present value of the net cash flows of the railway line over the lifetime of the new engine. Only in this unlikely example can market imperfections be relied on to serve the investor trying to assess the present value of an identical company that will not have to replace its engine whilst the market imperfections exist. Where more than one of the RCs of a firm's assets are affected by over-imputation, it is likely that their aggregation will overstate the company's net worth but this depends on a large number of factors of a type which most investors are unlikely to be able to assess. The likelihood of overstatement for a given firm is a function of, among other things, the commonality of its earnings with those of firms buying in the new asset markets, which is itself a function of the number of uses to which the assets can be put, the degree of market power achieved by asset suppliers and the width of the second hand market.

However, there are limits on the over-imputation process. Profit maximising asset suppliers with market power who attempt to set prices which capture both purchasers' super profits and normal profits will be acting in their own best interests only where their market power is temporary and their optimising calculations do not require repeat purchases, otherwise their conduct will force their customers into liquidation (this matter is examined in more detail in the next section). The likelihood of suppliers gaining from over-imputation is greater the less active is the market under consideration. Its impact declines in importance as both the variety of uses for the assets under consideration and the availability of substitute assets and technologies increase.

This analysis suggests that in the practical world the interpretation of accounting reports based on RC prices in situations where over-imputation is likely to occur requires considerable knowledge of both the markets from which these RC values are obtained, the characteristics of the firms acting in these markets and the degree to which the firm under consideration shares these characteristics. It also indicates that investors may be helped in arriving at a valuation for a firm if accounting statements show separately

the value of groups of assets complementary in revenue production and give details of both the technological make-up of each group of such assets and the entity's replacement plans for each group.

There is little reason to expect that the problem of over-imputation will affect differently NRV prices and RC values providing that an active and on-going second hand market exists. Indeed, the existence of an active second hand market should *ceteris paribus* reduce the likelihood of the difficulty arising in either market. However, the problem may occur in a particularly severe form if the assets under consideration, or reasonable substitutes, are no longer available in the new asset market. Suppliers of second hand assets where they face excess demand at the existing price may be able, because of their control of markets, special knowledge, and the existence of market imperfections, to set prices which absorb some or all of the joint cash flows to which the assets being traded are expected to render a contribution. However, sellers in financial difficulties may be forced to release assets at very low prices which reflect the few alternatives available to them. The NRV of a group of assets obtained by such sellers is likely to have little relation to their present value to an ongoing firm. Again, the investor needs to have considerable knowledge of the industry's technology and the conditions affecting the industry's capital asset markets before he can expect to be helped by current value accounting statements when estimating a firm's net worth.

Our reasoning suggests that with our assumptions, temporary disequilibria and imperfections in asset markets are irrelevant to the choice between RC and NRV as a base for valuing the firm's assets, except in a few special cases. The next section examines the effects on the utility of the two current value models to an investor attempting to estimate net worth, in the presence of long run market structure imperfections in both final goods markets and asset markets.

The effect of market structures

Given the wide variety of market structures which have been described in the economics literature, few general statements can be made concerning their likely effect on the valuation bases being considered.¹⁸ It is unlikely that accounting reports based on either NRV or RC prices will give any precise estimate of the present value of a firm's total net cash flows in imperfect markets for the pricing or output policies of

¹⁸For a detailed discussion of market structures and their effects on economic behaviour see F. M. Scherer, *Industrial Market Structure and Economic Performance*, Rand McNally, 1970.

any oligopolistic industry are normally indeterminate; even managers within an industry are likely to face substantial difficulties in forecasting cash-flows.

One proposal in the literature for use in situations of imperfect markets is to regard the source of market power as a separate asset.¹⁹ It is not clear how a quantitative estimate of the value of this 'intangible' asset can be obtained except as a residual after deducting from the firm's total value that of all its other assets. How these individual assets values are to be ascertained is not obvious.²⁰

Each type of market structure may have a different effect on asset values and the number of cases which could be discussed is large. We will consider briefly a few cases to see whether any tentative conclusions emerge. For simplicity, it will usually be assumed that firms producing final goods use only one type of tangible asset not subject to technical change and supplied by either single product firms or a second hand market that deals in only one asset. We examine either the situation where the assets are only used by firms in the final goods market under discussion or where they are used for the same purpose in many industries. The aim is to see whether anything can be said concerning the relationship between the RC, NRV and the PV of the assets of a firm in the final goods market. We will proceed by considering the effects of a variety of market structures in both the final goods market and the asset supply industry on this relationship for a firm in the final goods market. The market structures we will consider are shown in Table 1.

1a *Monopolist in the final goods market facing a perfectly competitive asset supply industry - assets of use in only one industry and having no substitutes*

¹⁹H. C. Edey, *op. cit.* p. 78.

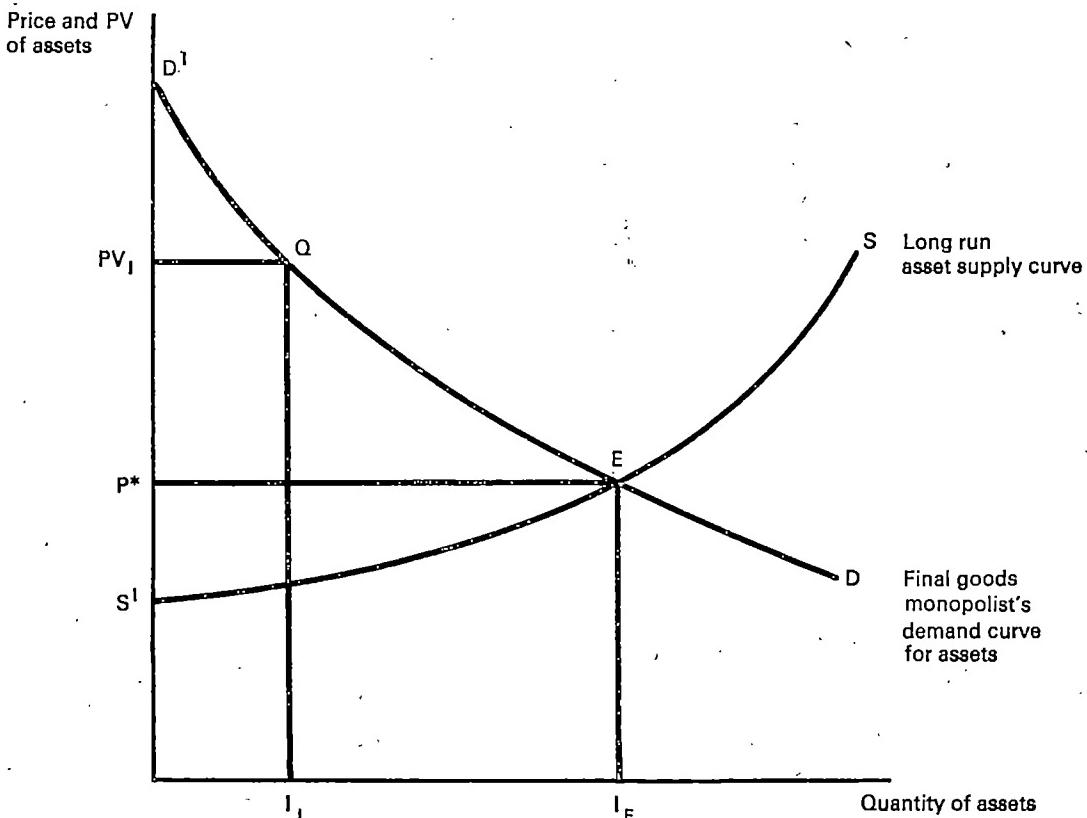
²⁰S. H. Penman, *op. cit.* especially pp. 338-343.

In this situation the total replacement cost of the monopolist's tangible assets will underestimate the present worth of his firm. The normal free entry assumption of perfect competition will ensure that the asset supply industry will face an equilibrium price for its assets which gives the suppliers only a normal return.

Diagram 1 illustrates the long run demand and supply curves (i.e. after allowing for the effects of free entry into the asset supply industry) for the asset we are considering. The demand curve (D^1D) will reflect the view of the monopolist in the final goods market concerning the present value of additional increments of the asset, that is the marginal revenue product of the investment. For example, the asset increment represented by Q on the demand curve is expected to produce final goods which will yield net cash flows having a present value of PV_1 , as shown on the vertical axis. Each additional asset purchased is assumed to yield a cash flow stream of lower value. The supply curve (S^1S) represents the average costs of supplying the quantity of assets shown on the horizontal axis. The free entry assumption ensures that such costs include only a normal return to the suppliers. The long run equilibrium price (P^*) is found in the usual way by observing where the demand and supply curves intersect. This price gives all firms in the asset supply industry a normal return for the workings of perfect competition ensure that all firms have the same costs. Thus in the situation shown in the diagram the replacement cost of the monopolist's assets is P^* and is equal to the present value of the marginal asset purchased by the monopolist. All intra-marginal assets have a present value greater than their RC in the market. For example, the asset increment represented by point Q on the demand curve has a present value of PV_1 and, therefore, is expected to earn super profits for the monopolist of (to have a positive net present value of)

TABLE 1
Market structures being considered

Final goods industry's market structure	Monopoly	Monopoly	Oligopoly	Perfectly Competitive	Oligopoly
Type of asset market structure faced by final goods firms	Perfect Competition	Perfect Competition	Perfect Competition	Monopoly/Oligopoly	Oligopoly
Single or multi-use asset	single-use	multi-use	multi-use	single and multi-use	single and multi-use
Sub-section in which discussed	1a	1b	2	3	4

Diagram 1 Determination of Asset Prices –**Monopolist Final Goods Industry Facing Perfectly Competitive Asset Supply Industry**

$PV_1 - P^*$. Thus to value the monopolist's optimal set of investments as shown by I_E at their replacement cost (P^*) will fail to capture any of the monopolist's super profits which are shown by the triangle D^1 , P^*, E .

Moreover, the monopolist should also be able to avoid all quasi-rents (producers' surpluses) which would otherwise be enjoyed by the suppliers in the short run, provided he is able to practice monopsonistic price discrimination, or is able to force a reconstruction of the industry in some way. For example, if in the short run the supply of assets were restricted to, say, the quantity shown on the vertical axis by I_1 , the asset supply industry would normally expect to make the super profits equal to the amount that average costs of producing these items fell below their price. This would not happen in the situation we are considering because the monopolist buyer of assets would come to an agreement with each supplying firm to pay no more than cost for the units it produces. Indeed the same reasoning suggests that the asset producers would not gain the usual pro-

ducers' surplus shown by the area S^1EP^* in the diagram. However, such conduct may not necessarily be in the monopolist's best interests because in the practical world by allowing super profits to be made he may speed the erosion of the production constraint by encouraging new firms to enter the new asset market at a faster rate than if no opportunities for super profits existed. In this situation RC is the only useful valuation base given the constraint of objectivity but yields little guidance as to the value of the net cash flows expected by the monopolist. NRVs would measure only the scrap value of any assets released by the monopolist.

1b Monopolist in final goods market facing a perfectly competitive asset supply industry – multi-use asset (i.e. used in more than one industry)

Identical reasoning to the above suggests that in this situation the price of new assets will fail to capture any of the monopolist's super profits. In the long run the price for all uses would be just sufficient to yield a normal return to surviving suppliers. Any super

profits captured in asset prices in the short run will reflect only the net cash flows expected by the marginal buyers utilising the assets. There would seem no reason to believe that NRVs of the assets would be affected any differently. The only thing to be said for both valuation bases is that in a dynamic environment either would seem better for our purposes than the historical cost model which will reflect none of the changes which occur after assets are purchased.

2 Oligopolistic final goods manufacturers facing perfectly competitive asset suppliers: Multi-use assets

In an equilibrium situation, if such can be said to exist in conditions where oligopolists face a perfectly competitive asset supply market, the replacement cost of assets will be such as to yield asset suppliers a normal return. The reasoning portrayed in Diagram 1 yet again yields this result. The only difference is that D^1D represents the aggregate of all demands for the asset at various prices. Moreover, as with our assumptions the same service potential should *ceteris paribus* sell at the same price irrespective of the market involved, neither RC nor NRV prices will reflect the super profits of the oligopolists in the final goods market.

Most of the factors acting to cause indeterminateness in the oligopolistic final goods market are likely to be irrelevant to asset prices because our assumption of a perfectly competitive market means that free entry into the asset supply industry will allow no individual firm in this industry to take advantage of such factors in the final goods market. However, both aggregated RC and NRV prices will during price cutting wars in the final goods market yield particularly bad measures of the value of an on-going enterprise. Oligopolists may be unwilling to buy assets until the situation is resolved and any firms forced into liquidation by price cutting may receive very depressed prices for their assets. This latter effect is minimised the wider are the alternative uses of the assets.

Firms within an oligopoly are likely to have different views as to the future profitability of the industry. Thus with temporary disequilibrium in the asset supply industry RC and NRV prices may reflect the expected profitability of the asset to the marginal buyer. These asset prices may measure all or part of his super profits and, therefore, be better, albeit still poor, indicators of the present value of the cash flows of other firms than are equilibrium prices.

3 Asset suppliers with market power selling to perfectly competitive final goods industries

Final goods industries cannot in any real sense be described as perfectly competitive in the most extreme situation of asset market power - where a monopolist supplier of assets exists. Such a monopolist is in a position to guide the conduct of the final goods producers so that he maximises his own profits. He will capture all super profits which would otherwise accrue to the final goods industry. His ability to pursue this type of action and to claw back consequent profits depends on the height and durability of the barriers to entry which protect the asset market. The accuracy of replacement costs of assets as a measure of the present value of existing assets of firms in the final goods market (assuming market conditions are unchanged) depends on the degree of control the monopolist can exert on the final goods industry. The monopolist's strategy for new assets will be successful only if he extends his control to the second hand market. Thus in positions of extreme market power in the asset supply industry the replacement cost of assets would reflect the present values attached to such assets by final goods firms but even this would not enable the investor to forecast the cash flows of a firm in the final goods industry under consideration unless he could estimate the normal return for such firms.

More generally, the NRV and RC prices of assets may capture part of any super profits available in the final goods market whenever there are any imperfections on the supply side of the asset market. However, without an intimate knowledge of the industry under consideration, there seems no way of either predicting the degree to which such profits will be reflected in asset prices or of quantifying the gap between both new and second hand prices and the present value of existing assets. With multi-use assets, unless the asset supply industry can discriminate between purchasers for different uses, its power to exploit will be limited by the strength of its control over the final goods market in which it encounters the greatest countervailing power or where it has the least control for other reasons.

We might expect the second hand supply to be less easy to control and NRV prices, therefore, both to reflect less well the present value associated with existing assets and ultimately to limit the power of asset suppliers to capture any super profits available in final goods markets. The strength of this constraint will depend on the size, width and perfection of the second hand market relative to the new asset market. The investor when interpreting accounting statements based on NRVs or RCs needs considerable knowledge of the market structures of both the industries which use the same assets as the firm he is considering and of the asset supply industry.

Any increase in asset prices brought about by asset suppliers capturing super profits will increase their accuracy as approximations to the PV of existing assets in the hands of firms in the final goods industry though they may still be very poor approximations. However, even if the process does work in the way described, it allows no real success in seeking an acceptable and verifiable base for valuing assets because first the process only works where there is market power in the asset supply industry.

As an illustration consider again the case discussed earlier in this section where the process worked successfully when a monopolist asset supplier faced a perfectly competitive final goods industry. In this situation the replacement cost of assets will be a good proxy for the present value of firms in the final goods industry. However, this will not be the case for the assets the monopolist himself uses to produce his output if the monopolist asset supplier himself buys from a perfectly competitive industry. Here we are back in the situation described in section 1b; the prices the monopolist pays for his assets will, therefore, provide a poor guide to his net worth.

Thus aggregated NRV and RC values for any firm cannot be regarded, in general, as providing a reasonable surrogate for the firm's present value. Although the oil industry gives evidence that some basic input suppliers may be able to exercise market power, it is unlikely that all firms earning super profits will face asset suppliers having sufficient market power to capture even part of these super profits. Moreover, even if final output firms do face asset suppliers with market power, the investor would need a detailed knowledge of the market structure of both the industry concerned and of those markets supplying assets to this industry before he could estimate how good a guide accounting statements based on RCs and NRVs were to the present value of the firm he has under consideration.

Secondly, even if this information were available to the investor, it would not necessarily help him to estimate a firm's expected cash flows. To arrive at such predictions, he would need to know the degree to which the assets of the firm under consideration are likely to be affected by the same monopolistic influences as those faced by current purchasers in the asset market. With this information the investor will know that his firm can be expected to earn a normal return plus any super profits not expected to be attracted by the asset suppliers. How the latter profits can be quantified is not clear. This difficulty remains even if the firm in mind is expected to escape entirely the attentions of monopolistic asset suppliers. Although such influences will move the total RC of the firm's assets towards its net worth,

this value can be used to help in estimating the firm's future cash flows only if the investor can somehow predict the return the firm will earn on this valuation.

Only aggregated asset values will have meaning where final goods firms utilise several assets which jointly produce revenue. The conclusions of the above analysis would seem to apply in the case where only one asset supplier has market power. But conflict between and differences in the market power of asset suppliers will render the total RC asset values of firms in the final goods market poor approximations of their present worth where those with market power supply more than one of the assets used by final goods firms.

In appraising the above conclusions it should be borne in mind that the situations discussed are also likely to provide a favourable environment for the over-imputation of profits within asset prices. However, conduct of this type is unlikely to be in the long term interests of those with the market power. Client firms may not be able to earn even a normal return and will either cease trading or encourage any attempts to dilute the market power of existing asset suppliers.

4 Oligopoly in both the final goods and the capital asset markets

Few, if any, general conclusions emerge in this situation. Asset prices may reflect some of the super profits existing in the final goods market. The extent of the capture will depend on the relative strength of the two sets of oligopolists in the asset supply and in the final goods markets. Moreover, the situation is likely to be unstable for there is an incentive for firms in either market to practice vertical integration.

The RC of assets at any time will reflect both expected cash flows and also the relative market power of asset suppliers at this time and thus may be poor guides to the present value of the assets of any given firm in the final goods market.

Predictions become even more difficult where the assets supplied by oligopolists are used in more than one industry in conditions where asset suppliers cannot practice price discrimination to any great degree. Here asset prices at any time will reflect the views of the marginal buyer and may have little relevance to the cash flows expected by any other firm.

The above analysis would seem to apply equally to the NRV of assets. An oligopolistic new asset industry will attempt to control the used asset market where such assets are substitutable for new ones. NRV prices may well be affected by the same influences as act on RC values where asset suppliers succeed in this task, provided that second hand assets have no uses unique to them.

This review of the effects of the competitive structure of markets on asset prices suggests that those who base their support for the RC model on the argument that it 'represents the consensus of the market as to the earning power of the asset in question' may be claiming too much.²¹ They also may be ascribing too great a superiority to RC prices relative to NRV prices, for the above analysis suggests that in the conditions considered the same influences often act on both valuation bases, though it is fair to say that other factors may render RC the superior valuation model. Moreover, the effect of market structure imperfections on asset prices seems to be easily predictable only where the market power in the asset supply market is high as compared with the final goods market.

Consideration of the effect of market structures on the valuation bases being studied suggests that only if the investor has access to a large amount of information concerning a considerable number of factors will he be able to gauge the usefulness of accounting reports as guides to a firm's net worth. Advocates of either of the current value models would seem well advised to abandon the surrogate thesis and to concentrate on demonstrating that these valuation bases can serve one or more of an investor's objectives better than accounting reports compiled using conventional principles.

Imperfect information

One possible cause of observed differences between RC and NRV asset prices is the different quality of the markets on which new and second hand assets are traded. For our research purposes we would like these markets to produce prices for separable bundles of joint assets on a regular basis. Such prices are not easily available in answer to routine enquiries. The ascertainment of NRV prices may require the employment of some type of specialist. The cost of such agents and valuers will have to be borne by the firm valuing its assets. Even where realisation actually takes place the selling firm may have to bear at least part of these costs. These costs if they are greater than those associated with similar new assets will *ceteris paribus* act to depress the NRV of an asset below its RC price.

The activities of brokers and dealers will have a significant effect on second hand prices where they have some type of monopoly power. They may be able to take advantage of any financial difficulties of sellers. They may have the ability to capture either

part of the super profits accruing to buying firms or the incremental contribution of assets to the joint profits of purchasing firms. The buying or selling prices of second hand assets quoted by such agents may be poor proxies for the present value of existing assets considered either individually or in combination.

These factors would seem to have less impact on values obtaining in the new asset market. Many of the costs of making a market and informing potential buyers will be borne in the first instance by asset manufacturers or their agents, and those who purchase at the going prices must deem the value of the expected cash flows to be at least equal to the assets' prices including these costs. Thus, the presence of these costs moves the RC price of assets toward their present values. If we abstract from super profits, aggregated RC valuations will underestimate the PV of existing assets where a buyer bears part of the costs of informing himself and making a market.

Information costs for equivalent transactions may be lower in the new asset market than in the second hand market. Each individual seller or agent in the NRV market is likely to incur some costs of learning about and using the market. The supplier of new assets also faces at least some of these costs but may experience economies of scale and may be able to spread the fixed element of his costs over a greater number of customers than can agents in the second hand market. The degree to which such cost reductions will be passed on to the final buyer depends on the market structure of both the asset supply and the final goods industries. Against this, new asset prices will incorporate items such as advertising expenditure, instructional costs and costs of distribution which may have no utility to a specific buyer. With the assumptions of this section it would seem that better quality markets are likely to render RC prices superior to NRV prices as approximations to the present values of existing assets, though neither will be correct.²²

Conclusions

The list of market imperfections examined could be substantially extended (a major omission is the failure to consider explicitly the effect of uncertainty). It should be borne in mind that we have not examined

²¹L. R. Amey, *The Efficiency of Business Enterprise*, George Allen and Unwin, 1969, p. 78. It is only fair to say that his conclusion is later qualified in a variety of ways.

²²Much empirical work is required to test this and other hypotheses concerning the effect of imperfect information and poor quality markets on the utility of the RC and NRV asset pricing models. Some recent work is reported in D. A. R. Forrester, 'Asset Valuation before and after Liquidation', *Accounting and Business Research*, No. 13 (Winter 1973), pp. 33-43 and C. R. Beidleman, 'Determinants of Second-Hand Asset Values', *Accounting and Business Research*, No. 14 (Spring 1974), pp. 102-115. Both articles give further references.

any situation where there exists simultaneously more than one impediment to perfect market operation. Empirical evidence is clearly required to test the tentative hypotheses suggested by this article, but some weak conclusions do emerge.

The exclusive reporting of either the NRV or the RC of a firm's net assets may fail to yield as good an approximation to the firm's present worth as is possible within current standards of objectivity. The advocacy of NRV because it can be shown to be superior to RC for a given purpose, neglects its possible inadequacies relative to some of the other objectives usually ascribed to accounting statements.

The analysis in the article suggests that even the dual reporting of NRV and RC values may not provide the best available guidance for estimating the firm's net worth from published accounts. In some cases the PV of a bundle of joint assets is best approximated by the former value and in others by the latter.

In the practical world neither valuation base seems likely to provide a reliable or useful estimate of a firm's present worth. The most general conclusion is that in the presence of market impediments the interpretation of accounting reports founded on either valuation seems to require an intimate knowledge of both the industry being considered and the tech-

nology available to the firm under consideration. This information is unlikely to be available to most investors even assuming that the cost of its collection were less than its benefits. Even if the information were obtainable, it would in all but very restrictive conditions allow the investor to say only that accounting reports based on RC and NRV prices either over or understated a firm's net worth. It is not clear how the degree of error could be quantified.

It thus seems that in a world where market impediments exist support for the use of RC or NRV prices in accounting reports cannot be based on the surrogate thesis. In appraising this conclusion it should be borne in mind that by assuming that perfect market assumptions are entirely applicable except for the impediment under consideration we have conducted our analysis in the environment which might be regarded as the most favourable to the surrogate thesis.

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Corporate Modelling: When success can be a long-term forecast

J. R. Precious and D. R. Wood

The purpose of this article is to summarise the experience which has been gained to date in the field of corporate computer model building by the British Titan Limited Finance Department. We have tried to place an emphasis on the practical aspects of our work: how we approached the technique from first principles; the errors which have been made during our limited four years' experience; the successes which we feel have accrued. There are three clearly defined phases through which we have progressed, and we close by looking at the future.

We hope that the attached diagrams, flow charts and selected printout material will both assist comprehension of events described in the text, and perhaps be of some little use to those contemplating modelling for the first time.

Phase I

The process of model building by computer began some four years ago, shortly after finalisation of the group's five year plan. The decision to take our first tentative steps in building an 'in-house' corporate model was made before the experience of compiling this particular plan by hand had receded into the memories of those concerned. That experience (at least to the accounting function) could probably best be summarised as: mass calculation, analysis, compilation and consolidation - repeated several times, to test forecast revisions - which, manually, is a time consuming process. It was therefore logical to conclude that use of the company's ICL 1900 series computer should, by the very time saved, allow a much closer look at the key variables through the medium of sensitivity analysis. Thus followed our first acquaintance with the ICL PROSPER programming package.

So the decision was made; but how to begin? And promptly, our first mistakes: we chose to approach

the task by straightforward transcription of the recent plan - using the accounting schedules to prepare an outline flow chart. We had unknowingly made two fundamental errors:

First, we had assumed that, by and large, each succeeding reappraisal of medium and long term plans would fit the format devised for the most recent manual assessment; and second, we devoted a relatively small amount of time (approximately two weeks) to the preparation of flow charts.

In other words, reduction of the accounting man-hours became the major objective. It did not, of course, follow that the resultant model would be particularly appealing in a practical sense to anyone other than accountants. Had we been content to merely simplify our own involvement in subsequent reviews, then in some ways the project could have been considered a partial success. But this was not our sole objective; it was not even the most important. We wanted to build a model which could be used by corporate planners to test the broader strategic aspects of possible courses of action open to the group. In this respect, the model was a failure.

Although it is true to say that the PROSPER package has in itself been developed to give better service to the user in terms of operation and output presentation during the last four years, the fact remains that our first corporate model suffered considerably from too much inflexibility. Most of its drawbacks resulted from a combination of this and the two major policy errors mentioned above, all of which were the direct result of our inexperience in this planning technique.

By the time the project was eventually complete, we had assembled a formidable list of items requiring amendment or improvement, which effectively meant a total program overhaul. Some of them are outlined below:

(a) The program was written as one complete model. It is not difficult to envisage the impact of this decision upon run time and paper: excessive consumption of both. So for example, to observe the effect of a change in sales prices on trading profits, we had to resign ourselves to a twenty minutes wait whilst the model ran from start to finish. Compared with the process of manual adjustments, this is of course an insignificant period. But when a computer is operational for many of the 24 hours in a day, working to closely defined schedules, time assumes a premium rating: one third of an hour used in this manner equates to a waste of resources.

Thus, we learnt the value of time spent in planning a program, and how the use of a number of sub-models can help to accelerate the results of sensitivity analysis.

(b) The opportunity to use the results of a series of instructions and forecasts in a different area of the model was not used to the full.

Another example may best illustrate the point. The group's manufactured end product demands considerable investment in raw material stocks. To calculate the usage cost of each raw material, assembly of the relevant stock accounts will obviously be necessary. But when complete, this process will also show the investment in raw material stocks at each period end - which in itself is a major element of working capital, necessary for the compilation of Cash Flows and Balance Sheets.

Because we elected to construct Trading Accounts, Cash Flows and Balance Sheets independently of each other, we did not take programming advantage of this obvious financial link. The result was a less efficient model than might otherwise have been the case, and once more the reason was lack of pre-program planning.

(c) There was only one way in which a sales forecast could be calculated.

The chosen method was to assume that finished product stocks would equate to a fixed number of weeks' sales (based on past experience), and with a known production capacity, sales would be the balancing figure. The principle was, of course, perfectly sound. But a planning model which does not offer any alternative means of constructing a key forecast is, taking too much for granted: inflexibility again.

(d) The standard of output presentation was poor. Some figures had been subject to rounding up procedures, but others contained two or three places of decimals. The impact on a casual observer would no doubt have been bewildering; but to

those concerned with some measure of detail, irritation may have led to despair.

Most long term planning models result in a considerable output of information when run in full. By giving minimum attention to printout formats, we did not assist any subsequent analysis of the results.

Naturally, there were more errors in this first model, but a lengthy catalogue has an air of repetition. We feel the above to be a representative and possibly useful selection to anyone interested from a practical viewpoint.

Of design successes, (other than the fact that the model was capable of operation, however inflexibly) three are perhaps worth passing mention:

(e) The raw materials of importance in the manufacturing process were assumed to be key determinants of factory cost; all other materials and services were consolidated into two summary headings.

An obvious decision - though it would have been equally simple to make numerous additions in portraying an 'accurate' factory cost statement. But we felt that the model, when operational, should be able to display effectively possible future trends in the business over a maximum ten year period. Consideration of detailed factory costs in this context simply yields a model with an excessive number of input forecasts, whose claims to greater accuracy are largely illusory.

(f) Calculation of working capital levels was also made on the basis of isolating key elements.

Another hardly less than obvious remark. So for the same reason outlined in (e) above - that it is always tempting to err on the side of detail in pursuit of the 'most accurate' result - we isolated the major elements of the company's investment in working capital. The annual movement in each largely governed the movement in working capital as a whole. As may be expected, the analysis showed that stock (finished product, raw material only) and trade debt were the determining factors. The remaining assets and liabilities had either relatively static levels or fairly predictable cyclical movements.

(g) There was a page selection print out facility. Item (d) above gave the major negative presentation error; this facility helped at least to minimise the discomfort. Thus, for example, to see the effects of an adjustment to sales prices (in terms of revenue, trading profit and cash flow) required only five of the more than forty pages to be printed. It was unfortunate that the construction of the model still necessitated operation of the complete program, despite the diminution in requested printout volume.

Phase II

It was late in 1972, after a year of comparative inactivity in the model building field, that serious thought was given to the development of our limited experience to date. This time we approached the problem in a rather less insular way. In conjunction with the Data Processing Manager, a report was prepared for the Group Financial Controller which proposed a revised and expanded modelling system, for the eventual use of all companies in the group. It explained the proposals under four main headings:

- Objectives
 - Benefits
 - Outline structure
 - Implementation and costs
- with three accompanying appendices:

- Detailed structure
- Key data elements
- A comparison of available modelling systems on the market.

It may be of interest to summarise the objectives and benefits of the system as they were seen at that time.

Objectives

- (a) Assist management in the evaluation of long term plans, using inter-linked computer based models to evaluate, and where possible optimise, profits and cash flow.
- (b) Enable subsidiary plans to be produced in local currencies prior to conversion and consolidation into sterling.
- (c) Provide detailed evaluation of sales and production forecasts; profit and loss accounts, balance sheets, cash flows, operating ratios and statistics, to be the minimum financial statements.
- (d) Show separately the effects of inflation.
- (e) Allow for the optimisation of certain specified functions.
- (f) Either incorporate or have access to a minimum of ten (preferably 20) years' historical statistics, to enable regression analysis to be carried out where requested.
- (g) Anticipate the necessity for new factories or extensions to those already in existence, and indicate where any increase in productive capacity could be undertaken, based on the available input data.

The remaining objectives were viewed in terms of implementation, running costs, and ease of operation.

- (h) Assemble a flexible structure with at least a five year life expectancy.
- (i) Keep the installation costs to a minimum, but without compromising achievement of the objectives as a whole.

(j) Be easy to maintain and develop, yet fast and efficient in operation (i.e. extensive use of disc storage).

(k) Enable alternative strategies to be evaluated without compromising original or basic data.

(l) Allow full acceptance and modification of data, with subsequent results displayed through computer terminals.

(m) Be capable of accepting as input data available information from other computer systems using the projected database.

(n) Incorporate alternative methods of data input through which the system may be activated.

(o) Ensure, if requested, that selected data and results be displayed through the various stages of operation.

Benefits

- (a) Would enable evaluation of long term plans to be carried out throughout the year.
- (b) Make more time available for detailed study of the results of alternative courses of action.
- (c) Enable the present five year view to be enhanced by a further five year period, thus allowing the investigation and development of potentially more far reaching strategies.
- (d) The provision of individual self-contained subroutines to encourage greater participation by line-management, in both the concept and formulation stages of the long term planning process.

Heady stuff! And to be at all comprehensible a structural outline of the complete model was required.

In summary, the following were the important aspects contained in this part of the report.

Outline structure

(a) There were to be three major areas of operation which could broadly be classified as marketing, production and finance.

(b) The complete model was to be operational in five individual, but linked, levels:

Level 1 Profit and loss accounts

- Balance sheets
- Cash flows
- Ratios and statistics.

Level 2 Summarised sales and production forecasts (in the form of trading accounts).

Level 3 Detailed marketing and production forecasts.

Level 4 Optimisation of marketing and production capacities.

Level 5 Determination of world demand for the product.

(c) The model was to be designated as a hierarchical structure - level 1 being the 'highest' and level 5 the 'lowest'. But it was recognised that in the interests of flexibility, there had to be provision both to transmit data and forecasts from one level to any other specified level (not necessarily in sequence) and to commence at any desired point. To be satisfactory, this effectively required that the upward sequence from levels 5 - 1 could be dispensed with if attention was to be directed to a particular planning area. It was therefore envisaged that a 'link data file' between each level and the next would give effect to these or any other operational circumstances requested.

An additional facility to be made available through these linking files was an overwrite option. In other words, as data progressed towards level 1, a user could make amendments to the result sequence by direct input of alterations or additions at each level. This was to ensure that the changed results or forecasts would be used thereafter in later levels of the model.

(d) There would be a similar set of sub-models for each company in the group in levels 1 - 3. This was seen as simplifying the process of consolidation in levels 1 and 2, when programming commenced.

(e) Output data from all stages of the model would be available in either horizontal or vertical form i.e. by function or company.

Although this completed the system in outline, some further amplification of the distinguishing characteristics in levels 2, 3 and 4 may assist clarification of the operational areas in the report.

Level 2: Summarised sales and production forecasts

(a) At this stage, a clear forecast relationship would have been established between sales and production functions throughout the group. The statistics could have been derived (through a logical operational sequence in the model, having commenced at level 5) or directly input at some intermediate stage through a link data file.

(b) Level 2 would be the highest point in the structure where consideration of production and sales could be made in units of each (the profit and loss accounts in level 1 would assume a statutory accounts format). It therefore follows that this would also be the highest level wherein a contribution gap could be deduced from independent sets of data.

(c) Both sales revenues and production costs would be expressed in summary form.

Level 3: Detailed marketing and production forecasts

(a) Seen as an intermediate stage between the global supply/demand formulation at levels 4 and 5 and subsequent corporate trading results at level 2.

(b) This sub-routine would thus be primarily concerned with the evaluation of sales within group companies, by sales or marketing characteristics.

(c) The construction of a production cost forecast differentiating between variable and fixed costs would be made at this point.

Level 4: Optimisation of marketing and production capacities

(a) Expected to be a marketing orientated sub-routine where production capability would be a limiting factor. Thus, a marketing strategy (either directly input or developed at level 5) beyond productive capacity would be satisfied by the model automatically taking note of the shortfall, and suggesting a construction location/programme based on previously input parameters e.g. group strategy, cost of capital, availability of funds, production costs, etc.

(b) The marketing programme established, and feasible within the above constraints, maximisation of group contribution would be attained by the distribution of sales and production targets to each manufacturing source, having regard to the appropriate costs and revenues existing at each.

The proposal was subsequently accepted and the project began early in 1973. We had thus progressed to

Phase III

Output specification

It was clear from the outset that with a (relatively) far more ambitious project under way, the original corporate model should be retired to the archives of experience. Clearly, to have attempted to amend the program would have taken more time than to write a new one.

This decision made, detailed output specifications were drawn up as a first step towards ultimate programming. During the course of this process, information gaps were discovered relating to the requirements of levels 4 and 5, such as to render their specification incomplete. As a result, and because each level would be programmed individually, it was decided to concentrate on levels 1, 2 and 3 in the first instance.

Flow charts

Although we already had composite output specifica-

tions for these areas, we determined that detailed flow charts should be drawn from them before programming work commenced (an early lesson remembered!) This approach may not meet with the general approval of those experienced in data processing or corporate modelling activities. Nevertheless, we felt that the analysis had been worthwhile for the following reasons:

- (a) the links to and from other levels and/or subroutines are clearly established.
- (b) forecast number usage is consequently restricted.
- (c) the effects of providing for alternative courses of action and sources of input are properly evaluated.
- (d) the programming function is simplified since objectives are clearly stated.
- (e) testing of programs and location of program errors is facilitated.
- (f) basic system design errors are readily evaluated, and the impact of their correction easily seen, prior to any program modification which may be necessary.

The original flow charts to the first three levels of the model are shown in Appendices 1 to 6. Naturally, there have been some amendments, since they were drawn as a direct result of programming and operational experience (for example, see comments (a) under Level 3 (below). However, they did, and largely still do, represent a basis for the current system.

Programming

Work commenced after certain fundamental program criteria had been established:

- (a) We elected to dispose of the multiple instruction requirement (i.e. duplication of basic instructions and forecast number sequences for all companies in the group) by programming the first three levels for one company alone. The remaining companies' comparable models and subroutines would thereafter be installed either by total or selected duplication of this 'base' model.
- (b) Level 3, containing much of the model's component detail, was the logical beginning.
- (c) Provision for the use of trend and adjustment factors would be accommodated in the programs, but they would not be displayed in the subsequent printout. (This simply meant that if any part(s) of the output tabulations were required for publication in the ensuing group plan, presentation would not be affected by extraneous detail.)
- (d) Where a company had more than one factory, the profitability of each would be assessed in addition to that of the company as a whole.

Level 3: Appendices 7(a)-(c)

(a) Almost immediately after commencement, some of the flowchart assumptions (Appendix 5) were in question. During the early programming stages of major raw material (MRM) manufacturing cost, a problem had arisen concerning the evaluation of each material's usage. Originally, it had been the intention to calculate a weighted average price based upon the costs of opening stock and subsequent annual purchases.

Unfortunately, this involved the use of a considerable number of loops which, in operational terms, only served to slow the program down. Considered in the context of the model as a whole, a desirable solution appeared to be valuation at the current year's purchase price: financially conservative in times of inflation and operationally faster. Some representative results are tabulated in Appendix 7(b).

(b) The next contentious programming area which we encountered was also reminiscent of the original corporate model: calculation of sales, production and stock levels of finished product.

It will be recalled that one method only was previously available. Mindful of this serious shortcoming, we therefore proposed the following options for user consideration:

- (i) Input: sales, production and first year's opening stock.
Calculate: Closing stock.
- (ii) Input: sales, closing stock and first year's opening stock.
Calculate: production.
- (iii) Input: sales and first year's opening stock.
Calculate: closing stock (as 'x' weeks' sales) and production.

In all cases, input could be either direct or from level 4, (when completed).

(c) The final reference to programming experience at this level of the structure concerns the assessment of fixed manufacturing costs, and in particular, a manpower planning facility.

As a result of time constraints, we were not able to conduct the background analysis which we felt the subject warranted: that is, a separate sub-routine for each factory payroll. In these circumstances, we made provision for only one category of process labour, which therefore had to represent a weighted average of all relevant employee grades. Nevertheless, we suggested that a forecast compiled from this undesirable base at least recognised that costs of (salaries and) wages depend on numbers employed, as well as annual increments. Therefore, any proposed increase in production should display a sharp rise in the company's manpower

investment if the resultant forecasts are to retain credibility. (See Appendix 7(c)).

During the first quarter of 1973, all programming and subsequent testing of the completed level 3 had been accomplished.

Level 2: Appendices 8(a)–(c)

(a) Once again, a flaw in the Output Specifications was quickly uncovered – this time in the calculation of depreciation and government grants.

We had presumed an instruction sequence operational here, immediately prior to compilation of the detailed Trading Account. But this overlooked the logical sequence which began in level 3 with the construction of individual factory and company profitabilities, where net depreciation is naturally a significant item of fixed cost.

We therefore had no alternative but to reopen level 3 and accommodate these amendments – a straightforward process which demonstrated (if demonstration was required) the inherent flexibility of a model comprising a series of individual sub-routines.

(b) Yet another departure from plan was also made when we determined that compilation of 'detailed' trading working capital was a more feasible proposition at this stage than the previously envisaged level 1.

The decision centred upon the degree of sophistication to be expected when considering certain strategies. For example, a ten year assessment of outline data, which may be expected to take place within the boundaries of the first level, was thought unlikely to use anything more complex than an *ad hoc* estimation of total annual working capital movement. On the other hand, we reasoned that a view which began with summarised forecasts of sales and production units could well require a comparative assessment (at least) of the significant working capital elements.

Other than discovering an error in the PROSPER package itself, which was subsequently corrected by ICL, mid year 1973 saw the completion of level 2.

All this enabled us to complete the programming for level 1 well before the end of the year. (Appendices 9(a)–(e)).

Reference has been made to the printout illustrations attached (Appendices 7–9). As may be surmised the figures shown are fictional to protect confidentiality. But they have been related to each other in the precise manner of live data.

Prior to their storage on disc, all three levels for the one company were run concurrently, and it was interesting to note that the total operational time of 26 minutes included ten minutes for card input. The

net effective 16 minutes comprised:

level 3	11 minutes
level 2	2 minutes
level 1	3 minutes

Up to date and beyond?

It is unfortunate that continued development has not progressed as we expected. There have been a number of reasons for the slow down, but by far the most significant is the perennial complaint of many in commerce and industry: staff shortages. It is to our immediate benefit that within the recent past, steps have been taken to alleviate the situation, and we anticipate that much (if not all) of the backlog will have been eliminated before the end of this year.

However, the above slightly despondent air is not to imply cessation of progress since June 1973; that would be far from true. We have managed to complete almost all the programming and subsequent testing of programs for other group companies, including the modifications which were necessary from the basic model described above. Disc storage space has been allocated for each, and the models are expected to be installed within the next two months.

To complete the first major segment of this second corporate modelling system therefore only requires the establishment of a consolidation routine at level 1; level 2 consolidation is already operational.

In the introduction to this article, we suggested that a view to the future would provide its conclusion. We do not propose to anticipate trends within the field of corporate modelling – that can safely be left to experts and those concerned with the development of the technique.

Within our own organisation, however, the immediate future is more readily discernible. With an enlarged availability of resources, the outstanding parts of levels 1, 2 and 3 will be speedily assembled and tested. In conjunction with colleagues in the Planning, Marketing and Data Processing Departments, we would anticipate completion of level 4 before the end of 1975.

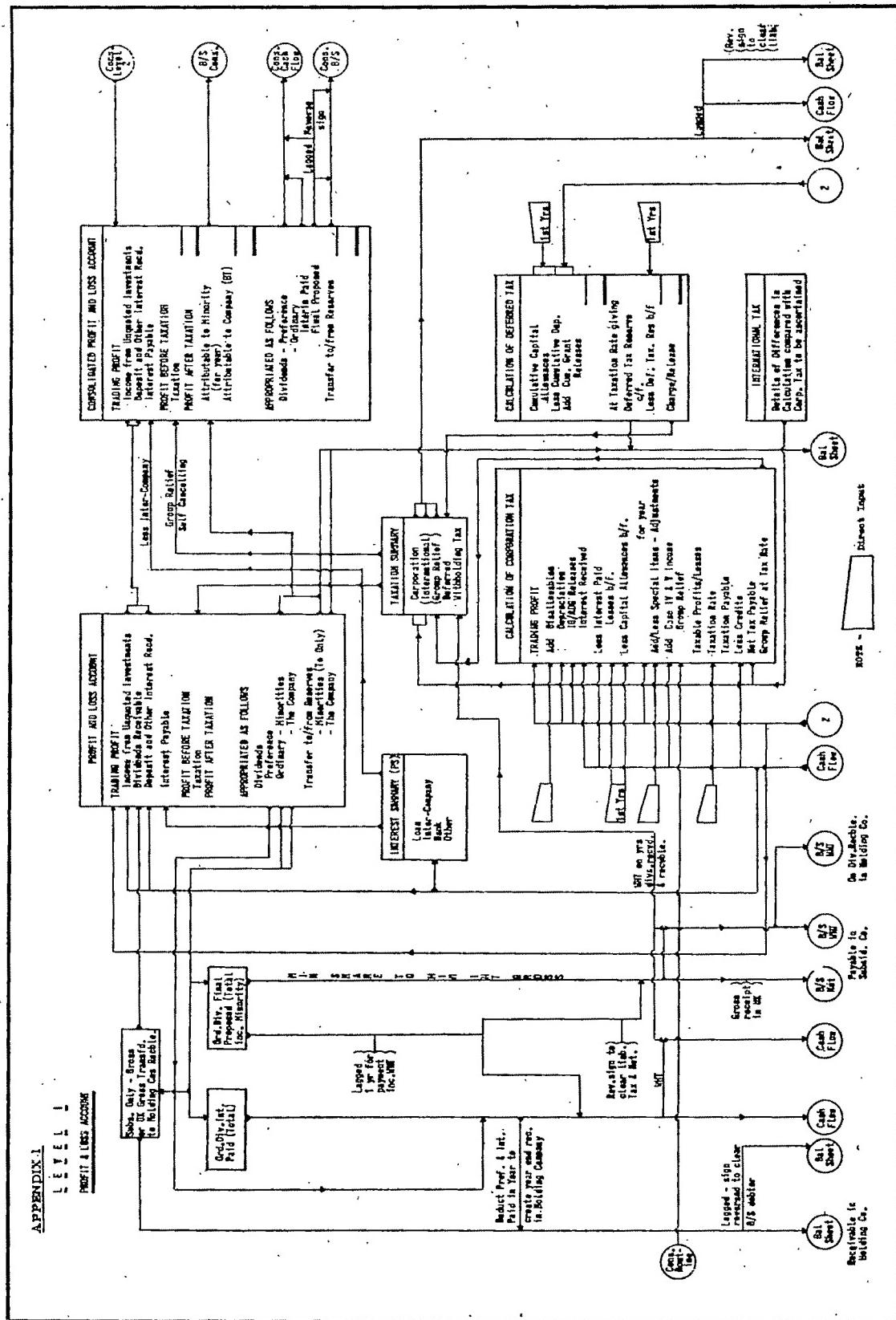
Of the original proposal, this would leave only level 5 to successfully conclude the project. However, it is now thought likely that work in this sphere will be deferred in favour of an additional sub-model at level 1. A program written during the last few months has already been the subject of some development work directed towards the establishment of corporate financial returns and objectives for the future. Its successful completion and addition to the present structure would, we believe, usefully enhance the Group's assessment of its long term objectives, and the strategy which might be employed in their

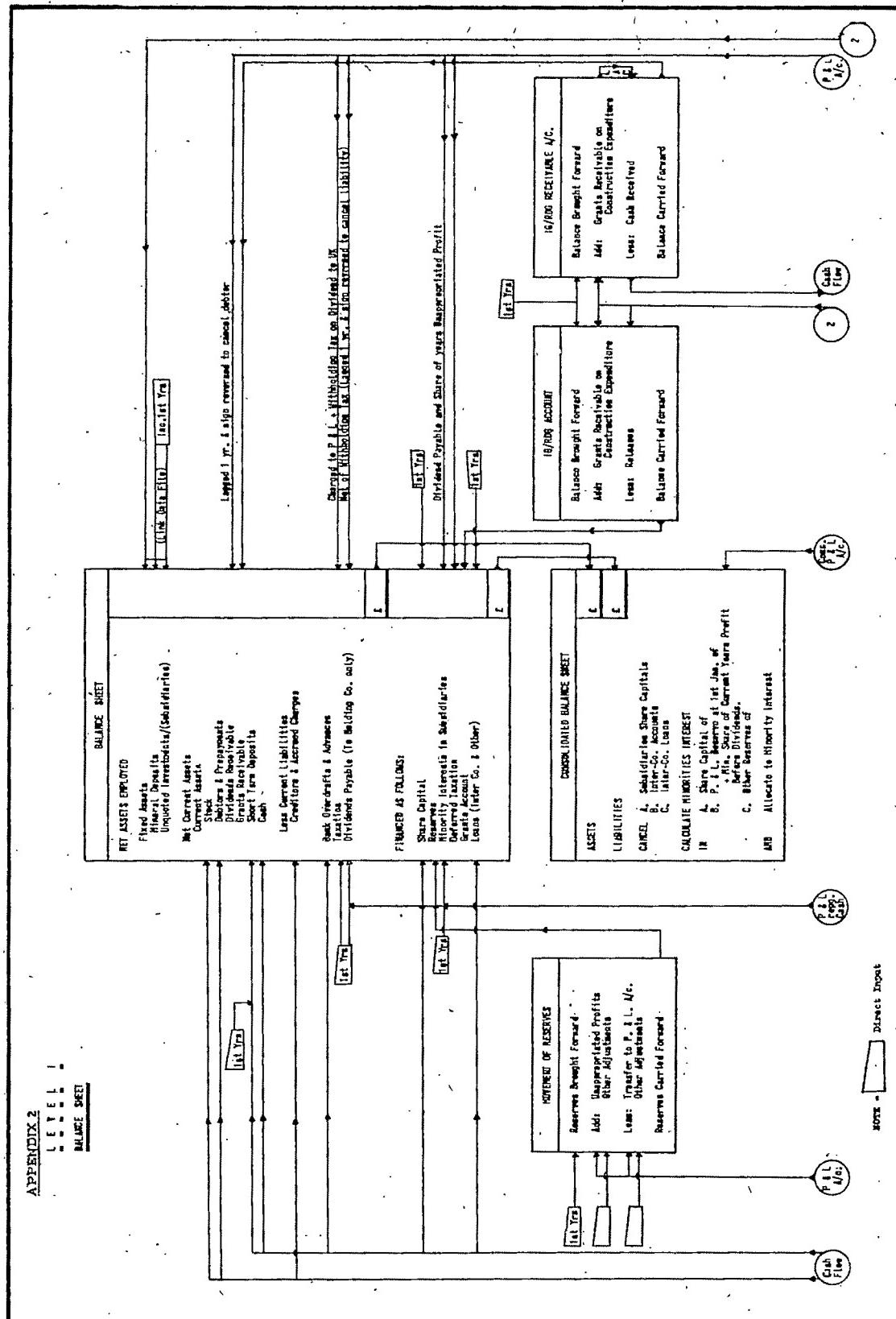
achievement.

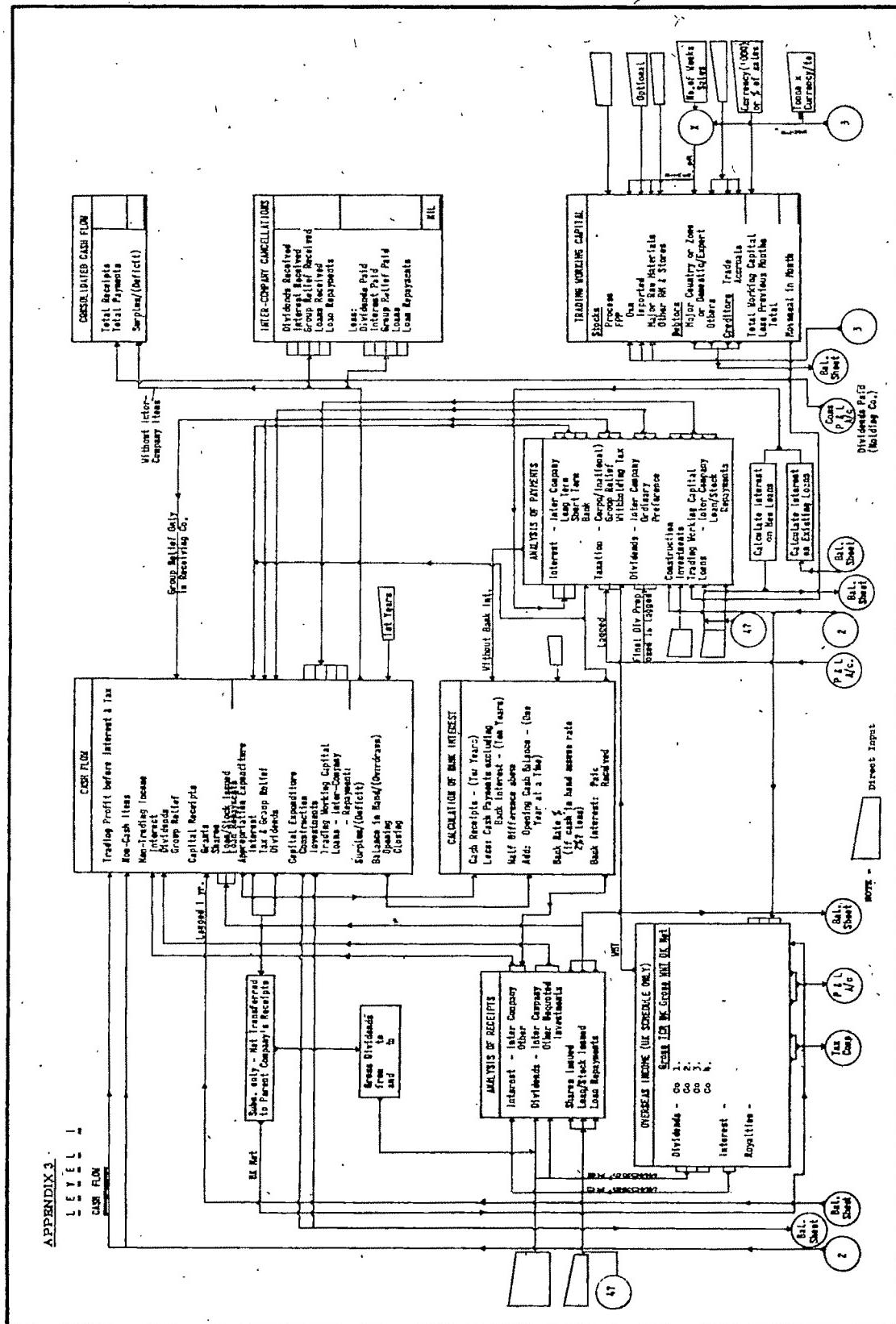
As in much work of a development nature, the end of a project may signal the beginning of new or related investigations. So with this company's approach to corporate modelling. We feel that with

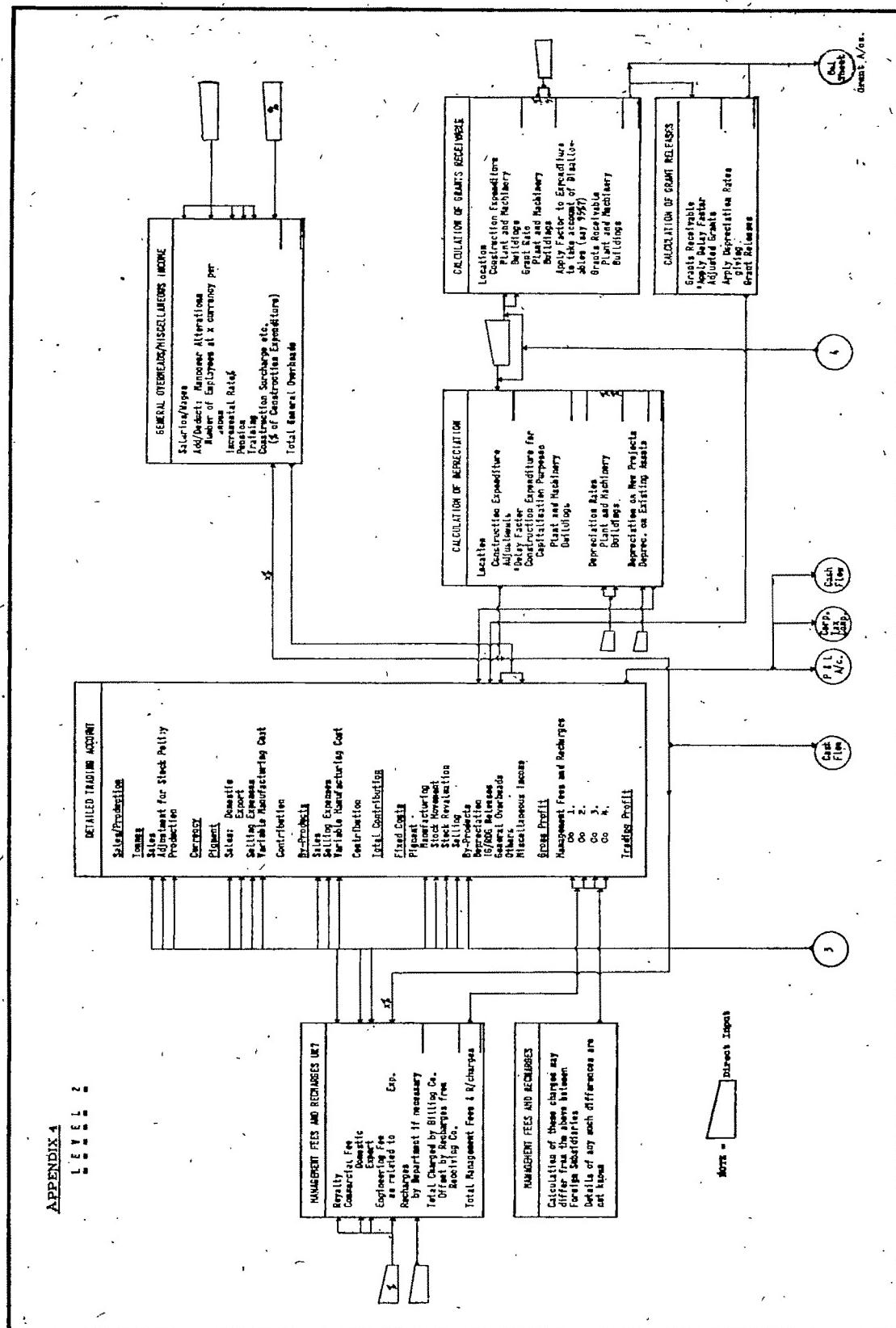
ACCOUNTING AND BUSINESS RESEARCH

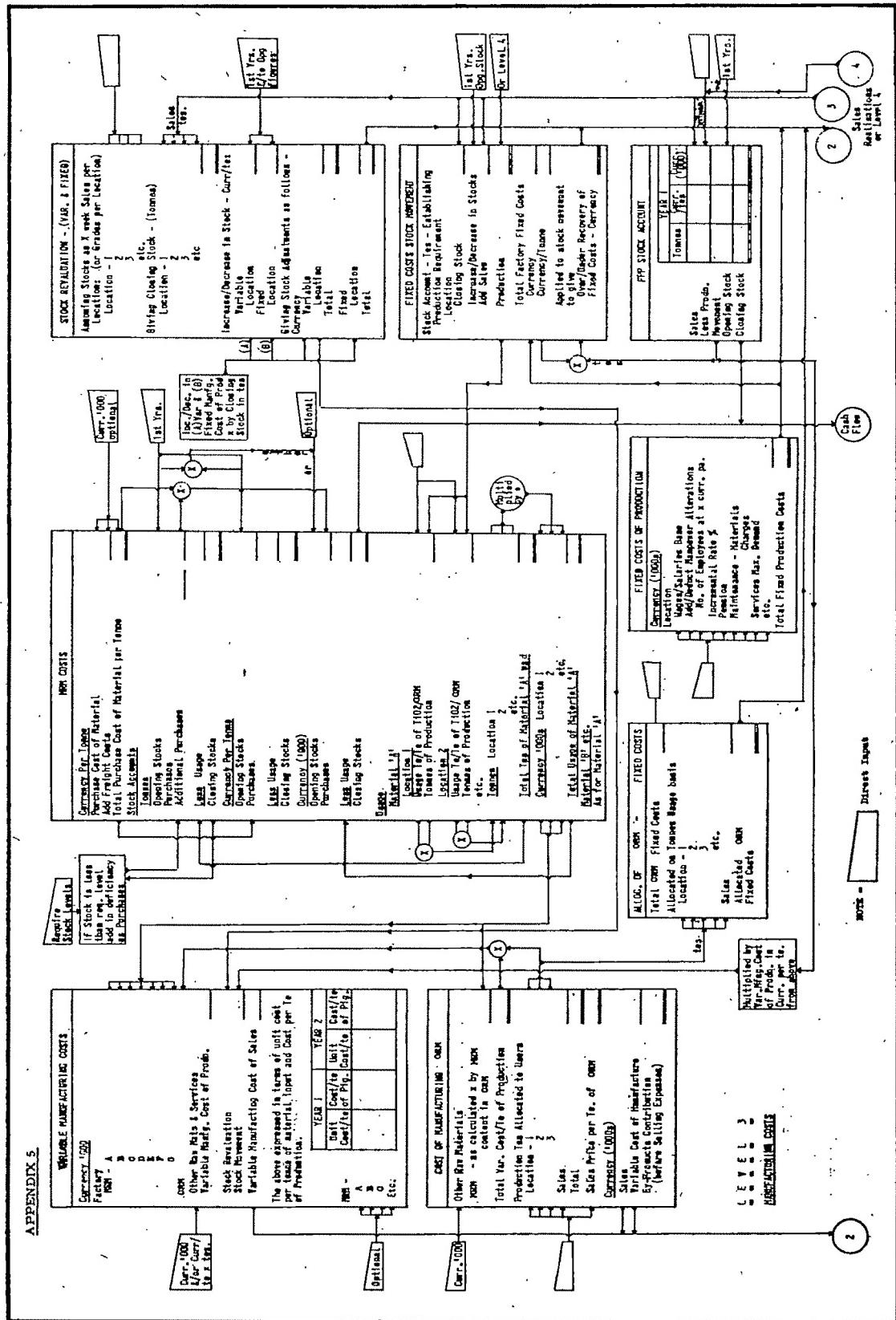
the resources at hand, two years represents the long term - the sort of timescale to be expected for completion of all the above outline proposals. It will be interesting to see, in 1976, if we managed to achieve our objectives.

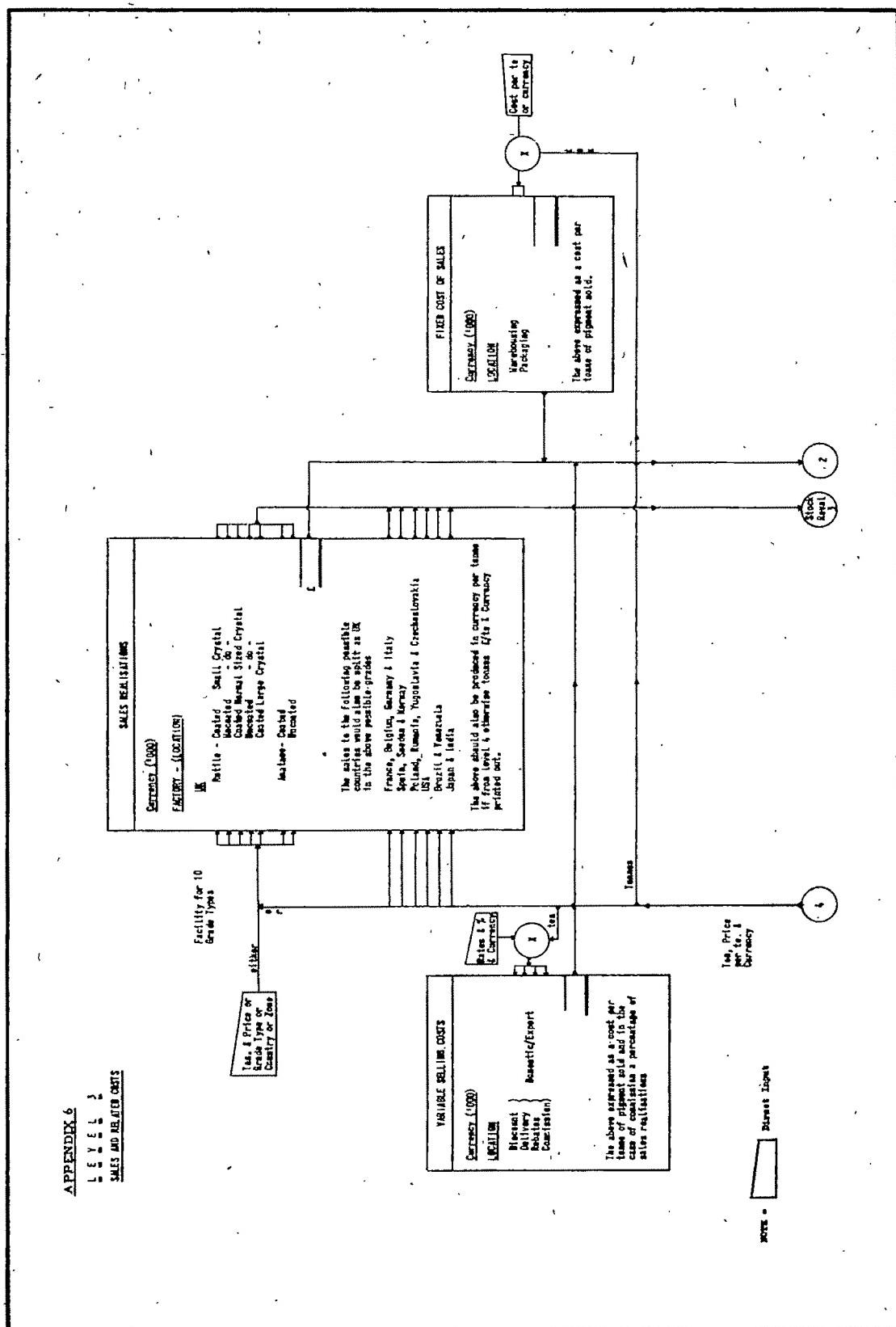












APPENDIX 7(a)

Variable manufacturing costs

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Location One										
Currency - ('000)										
Slag	398	439	482	529	527	550	877	907	950	1007
Sulphur	0	0	0	0	0	0	0	0	0	0
TICL4	23	27	26	27	28	27	43	46	47	48
Other raw materials	157	173	193	214	218	232	373	390	415	449
Variable mfg. production cost	578	639	701	770	771	809	1293	1343	1412	1504
Stock revaluation	-11	-2	-2	-2	-2	-2	-3	-4	-4	-4
Stock movement	18	0	-2	-2	2	0	-24	0	0	-1
Variable mfg. cost of sales	585	637	697	766	771	807	1266	1339	1408	1499
Unit cost per tonne of raw material										
Slag	17.77	19.00	19.91	20.94	21.88	22.77	24.12	25.41	26.61	27.78
Sulphur	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TICL4	53.05	60.58	55.68	56.25	56.42	57.84	62.52	67.88	69.03	70.12
ORM	14.75	15.71	16.73	17.82	18.98	20.21	21.52	22.92	24.41	26.00
Unit cost per tonne of pigment										
Slag	37.33	39.91	41.81	43.98	45.93	47.83	50.65	53.35	55.88	58.33
Sulphur	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TICL4	2.12	2.42	2.23	2.25	2.26	2.31	2.50	2.72	2.76	2.80
ORM	14.75	15.71	16.73	17.82	18.98	20.21	21.52	22.92	24.41	26.00
Variable cost/te of production	54.20	58.04	60.77	64.05	67.17	70.35	74.67	78.99	83.05	87.13
Stock revaluation	-1.00	-0.18	-0.18	-0.17	-0.17	-0.18	-0.18	-0.24	-0.23	-0.23
Variable cost/te of sales	53.20	57.86	60.59	63.88	67.00	70.17	74.49	78.75	82.82	86.90

APPENDIX 7(b)

MRM stock accounts – slag

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Tonnes										
Opening stock	15000	15759	15809	15598	15337	15748	16098	15723	16032	15832
Purchases	23150	23150	24000	25000	24500	24500	36000	36000	35500	36000
	38150	38909	39809	40598	39837	40248	52098	51732	51532	51832
Less usage	22391	23100	24211	25261	24089	24150	36366	35700	35700	36256
Closing stock	15759	15809	15598	15337	15748	16098	15732	16032	15832	15576
Currency/tonne										
Opening stock	17.25	18.77	19.54	20.57	21.52	22.54	23.27	24.77	25.92	27.12
Purchases	17.50	18.27	19.30	20.25	21.27	22.00	23.50	24.65	26.85	27.00
Cost	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
Freight										
	18.77	19.54	20.57	21.52	22.54	23.27	24.77	25.92	27.12	28.27
Usage	17.77	19.00	19.91	20.94	21.88	22.77	24.12	25.41	26.61	27.78
Closing stock	18.77	19.54	20.57	21.52	22.54	23.27	24.77	25.92	27.12	28.27
Currency – ('000)										
Opening stock	259	296	309	321	330	355	375	390	416	429
Purchases	435	452	494	538	562	570	892	933	963	1018
	694	748	803	859	882	925	1267	1323	1379	1447
Less usage	398	439	482	529	527	550	877	907	950	1007
Closing stock	296	309	321	330	355	375	390	416	429	440
	296	309	321	330	355	375	390	416	429	440

APPENDIX 7(c)**Fixed costs of production – Location One**

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Salaries/Wages										
Number of employees at present	55	55	55	55	55	55	55	55	55	55
At average earnings of	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Equals cost of	110	110	110	110	110	110	110	110	110	110
Increase/decrease in employees	0	2	0	0	1	15	2	0	0	0
Cumulative change	0	2	2	2	3	18	20	20	20	20
At average earnings of	0	1950	1950	1950	1950	1950	1950	1950	1950	1950
Equals cost of	0	4	4	4	6	35	39	39	39	39
Total base salaries	110	114	114	114	116	145	149	149	149	149
Incremental ratio	1.00	1.00	1.07	1.16	1.24	1.34	1.44	1.54	1.66	1.78
Total salaries/wage cost	110	114	123	132	144	194	214	230	247	266
Currency – ('000)										
Salaries/wages	110	114	123	132	144	194	214	230	247	266
Pensions	7	7	8	9	9	10	11	11	12	13
Maintenance										
—materials	13	14	15	16	17	19	20	22	23	25
—charges	9	9	10	10	11	11	12	13	13	14
Services maximum demand	2	2	2	2	2	3	3	0	0	0
Rates	18	17	19	20	22	24	26	27	30	32
Other	3	3	3	3	4	4	4	4	4	5
Adjustments	5	8	9	7	2	-4	-7	-8	-8	-1
Total fixed cost of production	166	174	189	199	211	261	282	299	321	344

APPENDIX 8(a)**Summary of trading working capital**

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Currency – ('000)										
Stocks										
Finished product – Type 1	258	268	268	277	282	295	335	354	367	385
– Type 2	10	17	31	0	0	0	0	0	0	0
Process	268	285	299	277	282	296	335	354	367	385
Major raw materials	100	105	111	117	124	131	138	146	153	162
ORM & stores stocks	3081	3560	4420	5495	6784	8196	9617	11019	12535	14196
260	274	289	305	322	340	358	378	399	421	
Total stocks	3709	4224	5119	6194	7512	8962	10448	11897	13454	15164
Debtors										
Trade	1530	1625	1785	1943	2055	2199	2630	2829	3032	3261
Other	211	223	235	248	261	276	291	307	324	342
Total debtors	1741	1848	2020	2191	2316	2476	2921	3136	3356	3603
Creditors										
Trade	580	612	646	681	719	758	800	844	891	939
Accruals	106	112	119	126	135	144	151	160	169	180
Total creditors	686	724	765	807	854	902	951	1004	1060	1119
Total working capital	4764	5348	6374	7578	8974	10535	12418	14029	15750	17648
Less previous year's total	3200	4764	5348	6374	7578	8974	10535	12418	14029	15750
Movement in year	1584	584	1026	1204	1396	1561	1883	1611	1721	1898

APPENDIX 8(b)**Details of trading working capital**

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
MRM stocks										
Ilmenite										
Tonnes	17649	17149	16649	16149	15849	15149	14649	14149	13649	13149
Currency/tonne	22.32	23.03	23.03	22.80	23.56	24.03	24.92	25.51	26.51	28.15
Currency - ('000)	394	395	384	368	369	364	365	361	362	370
Slag										
Tonnes	15759	15809	15598	15337	15748	16098	15732	16032	15832	15576
Currency/tonne	18.77	19.54	20.57	21.52	22.54	23.27	24.77	25.92	27.12	28.27
Currency - ('000)	298	309	321	330	356	375	390	416	429	440
Sulphur										
Tonnes	0	0	0	0	0	0	0	0	0	0
Currency/tonne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Currency - ('000)	0	0	0	0	0	0	0	0	0	0
Pyrites										
Tonnes	0	0	0	0	0	0	0	0	0	0
Currency/tonne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Currency - ('000)	0	0	0	0	0	0	0	0	0	0
Rutile										
Tonnes	29523	38993	49207	60917	73007	85222	97379	109639	121699	133857
Currency/tonne	81.00	73.25	75.50	78.75	83.00	87.50	91.00	93.50	96.50	100.00
Currency - ('000)	2391	2856	3715	4797	6060	7457	8862	10242	11744	13386

APPENDIX 8(c)**Details of trading working capital - continued**

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Other										
Tonnes	0	0	0	0	0	0	0	0	0	0
Currency/tonne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Currency - ('000)	0	0	0	0	0	0	0	0	0	0
Coke										
Tonnes	0	0	0	0	0	0	0	0	0	0
Currency/tonne	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Currency - ('000)	0	0	0	0	0	0	0	0	0	0
Total MRM stocks										
Currency - ('000)	3081	3560	4420	5495	6784	8196	9617	11019	12635	14196
Calculation of trade debtors										
Home										
Type 1 sales	4426	4725	5000	5530	5972	6415	7845	8505	9338	9975
Type 2 sales	147	116	84	45	0	0	0	0	0	0
X No. of weeks sales	4572	4841	5084	5575	5972	6415	7845	8505	9338	9975
	8	8	8	8	8	8	8	8	8	8
Home trade debtors	703	745	782	858	919	987	1207	1308	1437	1535
Export										
Type 1 sales	3545	3797	4345	4703	4923	5250	6166	6592	6913	7478
Type 2 sales	37	16	0	0	0	0	0	0	0	0
X No. of weeks sales	3582	3813	4345	4703	4923	5250	6166	6592	6913	7478
	12	12	12	12	12	12	12	12	12	12
Exp. trade debtors	827	880	1003	1085	1136	1212	1423	1521	1595	1726
Total trade debtors	1530	1625	1785	1943	2055	2199	2630	2829	3032	3261

APPENDIX 9(a)

Cash flow statements

Cash flow statements		1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Trading profit before interest and tax		2244	2289	3038	3645	4108	4605	5921	6492	7255	8084
Grant releases		-1	-3	-3	-4	-4	-5	-15	-39	-53	-53
Reg. development		-31	-31	-31	-31	-31	-31	-31	-31	-31	-31
Investment		564	601	596	587	564	544	579	705	773	746
Depreciation		2766	2856	3600	4197	4635	5113	6454	7127	7944	8746
Non-trading income		0	0	32	51	47	99	117	144	278	364
Interest		2766	2856	3632	4248	4682	5212	6571	7271	8222	9110
Capital receipts		40	31	6	6	6	6	281	236	6	6
Grants received		0	0	0	0	0	0	0	0	0	0
Reg. development		0	0	0	0	0	1575	0	0	0	0
Investment		0	0	0	0	0	975	0	0	0	0
Shares issued		0	0	0	0	0	500	0	0	0	0
Loan stock issued		0	0	0	0	0	0	0	0	0	0
Loans received i/co		0	0	0	0	0	0	0	0	0	0
Loan repayments		0	0	0	0	0	0	0	0	0	0
Adjustments		0	0	0	0	0	0	0	0	0	0
		2806	2887	3638	4254	4688	8268	6577	7532	8458	9116
Appropriations		408	376	338	313	313	478	478	478	478	478
Interest		660	483	979	1468	1812	2044	2238	2173	2683	3842
Taxation		500	647	668	962	1196	1360	1500	1980	2196	2518
		1248	1381	1653	1511	1367	4386	2361	2901	3101	2278
Capital expenditure		52	52	52	52	52	1752	1202	52	52	52
Construction		1564	584	1026	1204	1396	1561	1883	1611	1721	1898
Trading working capital movement		0	0	0	0	0	0	0	0	0	0
Loans made i/co		0	250	250	250	0	0	0	0	0	0
Loan stock repaid		0	0	0	0	0	0	0	0	0	0
Loans repaid i/co		30	-20	-10	-10	0	0	0	0	0	0
Short term deposits		0	0	-1	0	1	-1	0	0	0	0
Adjustments		-398	515	336	15	-82	1074	-724	1238	1328	328
Surplus-deficit		25	-373	142	478	493	411	1485	761	1999	3327
Balance in hand-overdrawn		-373	142	478	493	411	1485	761	1999	3327	3655
Opening		25	-373	142	478	493	411	1485	761	1999	3327
Closing		25	-373	142	478	493	411	1485	761	1999	3327

APPENDIX 9(b) Profit and loss accounts

Profit and loss accounts	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Trading profit	2244	2289	3038	3645	4106	4605	5921	6492	7255	8084
Deposit and other interest received	0	0	32	51	47	99	117	144	278	364
	2244	2289	3070	3696	4153	4704	6038	6636	7533	8448
Interest payable	408	376	338	313	313	478	478	478	478	478
Profit before tax	1836	1913	2732	3383	3840	4226	5560	6158	7055	7970
Taxation	973	1023	1460	1788	2026	2226	2920	3230	3698	4172
Profit after tax	863	890	1282	1595	1814	2000	2640	2928	3357	3798
Appropriated as follows:										
Dividends	647	668	962	1196	1360	1500	1980	2196	2618	2848
Transfer to reserve	216	222	320	399	464	500	660	732	839	960
	863	890	1282	1595	1814	2000	2640	2928	3357	3798

APPENDIX 9(c)**Balance sheets**

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Net assets employed										
Fixed assets – net	9398	8949	8405	7870	7368	6866	7839	8536	7815	7121
Deferred expenditure	100	0	0	0	0	1700	1350	0	0	0
Net current assets										
Current assets										
Stocks	3709	4224	5119	6194	7512	8982	10448	11897	13454	15184
Debtors and prepayments	1741	1848	2020	2191	2316	2475	2821	3136	3356	3603
Grants receivable										
Reg. development	31	6	6	6	6	6	261	236	6	6
Investment	0	0	0	0	0	0	0	0	0	0
Current accounts	120	120	120	120	120	120	120	120	120	120
Short term deposits	90	70	60	50	50	60	50	60	60	50
Cash	0	142	478	493	411	1485	781	1999	3327	3655
	5681	6410	7803	9054	10416	13098	14561	17438	20313	22698
Less										
Current liabilities										
Creditors and accruals	686	724	765	807	864	902	951	1004	1060	1119
Bank overdraft	373	0	0	0	0	0	0	0	0	0
Taxation	483	979	1468	1812	2044	2238	2173	2683	3842	4365
Dividends payable	647	668	962	1196	1360	1600	1980	2196	2518	2848
	2189	2371	3195	3815	4258	4640	5104	5883	7420	8332
Net current assets	3502	4039	4608	5239	6157	8458	9457	11555	12893	14266
	13000	12988	13013	13109	13515	17024	18646	20091	20708	21387
Financed as follows:										
Share capital	5500	5500	5500	5500	5500	7000	7000	7000	7000	7000
Share premium	1750	1750	1750	1750	1750	1800	1800	1800	1800	1800
Profit and loss a/c	216	438	758	1157	1611	2111	2771	3503	4342	5292
	7466	7888	8008	8407	8861	10911	11571	12303	13142	14092
Deferred taxation	1020	1064	1048	1022	1004	992	1739	2286	2142	1949
Grant accounts										
Reg. development	290	293	296	298	300	301	547	744	697	650
Investment	319	288	257	226	195	164	133	102	71	40
Inter-co loans	105	105	105	105	105	805	606	605	605	605
Loan stock	3800	3550	3300	3050	3050	4050	4050	4050	4050	4050
	13000	12988	13012	13108	13515	17023	18645	20090	20707	21386
Rounding difference	0	0	1	1	0	1	1	1	1	1
	13000	12988	13013	13109	13515	17024	18646	20091	20708	21387

APPENDIX 9(d)
Calculation of corporation tax

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Trading profit	2244	2289	3038	3646	4106	4605	5921	6492	7255	8084
Add										
Disallowables	55	55	55	55	55	55	55	55	55	55
Depreciation	554	601	596	687	564	544	579	705	773	746
Grant releases										
Reg. development	-1	-3	-3	-4	-4	-5	-15	-39	-53	-53
Investment	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31
Interest received	0	0	32	61	47	99	117	144	278	364
	2821	2911	3687	4303	4737	5267	6626	7326	8277	9165
Less										
Interest paid	408	376	338	313	313	478	478	478	478	478
Losses brought forward	20	0	0	0	0	0	0	0	0	0
Capital allowances	1464	652	527	506	493	485	1970	1688	411	292
Adjustments	0	0	0	0	0	0	0	0	0	0
Taxable profits—losses	929	1883	2822	3484	3931	4304	4178	5160	7388	8395
Taxation rate %	52	52	52	52	52	52	52	52	52	52
Taxation payable	483	979	1468	1812	2044	2238	2173	2683	3842	4365
Less credits	0	0	0	0	0	0	0	0	0	0
Net tax payable	483	979	1468	1812	2044	2238	2173	2683	3842	4365

APPENDIX 9(e)
Calculation of bank interest

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Cash receipts	2806	2887	3606	4203	4641	8169	6460	7388	8180	8752
Less										
Payments excluding bank interest	3184	2369	3303	4239	4769	7195	7301	6294	7130	8788
	-378	628	303	-36	-128	974	-841	1094	1050	-36
Half difference above	-189	264	162	-18	-64	487	-420	647	525	-18
Add										
Opening balance	26	-373	142	478	493	411	1485	761	1999	3327
	-164	-109	294	460	429	898	1065	1308	2524	3309
Bank interest rate %										
Paid	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Received	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00	11.00
Bank interest										
Paid	20	13	0	0	0	0	0	0	0	0
Received	0	0	32	51	47	99	117	144	278	364

Accounting Standards – A Blind Alley?

Colin J. Jones

Introduction

The latter part of the 1960s was notable for increasing public disquiet as to the quality and reliability of published financial accounts. Criticisms of accounting were particularly strong in relation to discrepancies between forecast financial information provided by companies involved in take-over situations and subsequent financial accounts. Two well publicised examples involved Associated Electrical Industries Ltd. and The General Electric Co. Ltd., in 1967, and Pergamon Press Ltd. and Leasco Data Processing Corporation in 1969.

Shortcomings in financial accounting practices had been the subject of debate by practising and academic accountants for a number of years. However, to persons outside the profession, the major accounting bodies did not appear to be particularly concerned with attempting to solve the many problems faced by the accountant in practice. As long ago as 1952, The Institute of Chartered Accountants in England and Wales issued a statement pointing out that accounts prepared upon the basis of historic cost:

'... are not a measure of increase or decrease in wealth in terms of purchasing power; nor do the results necessarily represent the amount which can prudently be regarded as available for distribution, ... the results shown by such accounts are not necessarily suitable for purposes such as price fixing, wage negotiations and taxation ...'¹

Yet having stated that financial accounts were unsuitable for almost all decision-making purposes, little or nothing was done to overcome the problems identified. This was almost certainly due to a consensus of opinion within the profession that the primary purpose of financial accounting was to report to shareholders on the stewardship of resources.² At the least stewards (management) may be considered liable to deal honestly with the resources entrusted to their care. In the corporate context, stewards are

considered to be additionally responsible for the efficiency with which they manage resources. While conventional reporting practices allowed an opinion to be expressed on the former aspect of stewardship, they only partly, and inadequately, provided information on the extent to which management showed competence in the allocation of the resources under their control. A dichotomy therefore existed between the accounting profession and external users of the annual accounts. This was particularly manifest in the financial press when reporting on companies for the benefit of investors. The accountant *may* have been clear as to the basis, purposes and limitations of financial reporting. The non-accountant, however, may possibly be excused for failing to understand that reported profits could justifiably vary if different accrual accounting procedures were adopted, or if different assumptions were applied to incomplete transactions at the financial year end. Similarly, the accountant knew that the balance sheet valuation of a company was based upon historic cost. The layman, however, may well have thought that the balance sheet represented a totally different form of company valuation.

This dichotomy between accountant and layman, with the resulting adverse publicity in relation to specific company results exemplified above, led in

¹Members' Handbook, The Institute of Chartered Accountants in England and Wales, Recommendation 15.

²For an outline of the development of the stewardship concept, see A. C. Littleton and U. K. Zimmerman, *Accounting Theory: Continuity and Change*, Prentice-Hall, 1962, p. 24 and p. 84. See also David Flint, 'The Role of the Auditor in Modern Society: An Exploratory Essay', *Accounting and Business Research*, No. 4, Autumn 1971, pp. 287-293; Harold Edey, 'The Nature of Profit', *Accounting and Business Research*, No. 1, Winter 1970, pp. 54-55; and Peter Bird, *Accountability: Standards in Financial Reporting*, Haymarket Publishing Ltd., 1973, pp. 1-35.

December, 1969, to a Statement of Intent on Accounting Standards in the 1970s, issued by The Institute of Chartered Accountants in England and Wales. Possibly the most important part of the statement referred to the Institute's intention to narrow the areas of difference and variety in accounting practice. The Statement of Intent was followed by the formation of The Accounting Standards Steering Committee (ASSC) on which sit members from five of the major accountancy bodies. The ASCC is primarily concerned with the compilation and issue of Exposure Drafts on specific accountancy problems and the formulation of accounting standards. The observance of these standards, once approved by the relevant accounting bodies, is generally mandatory upon accountants concerned with the preparation and publication of financial accounts.³

It is the contention of this paper, that, from a position of relative inactivity, the accounting profession is now embarked upon a programme of standardisation of accounting practices without adequate forethought or research into what it is trying to achieve. The ASCC has unquestioningly accepted the traditional stewardship framework of financial reporting, and has formulated Discussion Papers, Exposure Drafts and Accounting Standards without prior research or agreement upon the objectives of financial reporting. Only recently has it been announced that the Consultative Committee of Accounting Bodies (CCAB) has established a working party to identify the users of published financial reports and their informational needs.⁴ Their findings will presumably be relayed to ASCC. It is, however, notable that the ASCC did not itself set up such a working party. A further complication is added by the number of international bodies concerned with standardisation, European Economic Community Directives, and governmental action as instanced by the formation of the Sandilands Committee to consider inflation accounting.

It is surely now time to halt the standardisation programme, at least until the CCAB report is

³The Explanatory Foreword to Statements of Standard Accounting Practice makes clear that members of the relevant accountancy bodies are expected to use their best endeavours to ensure that standards are observed, or if not observed, that significant departures and their effects are disclosed and explained in the accounts. Furthermore, members acting as auditors are expected to justify their concurrence with a departure from standard practice. It should be noted that the observance of accounting standards is not mandatory upon company directors, the persons responsible for published financial statements, unless they are members of the participating accountancy bodies.

⁴See *The Accountant's Magazine*, December, 1974, p. 464.

ACCOUNTING AND BUSINESS RESEARCH

available. The existing approach to standardisation carries the real danger that entrenched attitudes will be imposed upon accounting development, attitudes that will be all the harder to remove if at a later date it is discovered that the assumptions underlying the present programme are invalid. It is further postulated that the present approach towards improving the quality of financial reporting is in principle misdirected, and that any informational gains achieved are likely to be of minimal value to users. The reasons for this viewpoint, and a partial solution to the problem of improving the utility of financial statements, are developed in the following sections.

The present position – national and international

At the time of writing, the ASCC has published thirteen exposure drafts, eight of which have been converted into full Statements of Standard Accounting Practice by the British accountancy bodies and one into a provisional standard (on inflation accounting).

In addition to the ASCC and the CCAB, the following international committees exist.

1. IASC – International Accounting Standards Committee. This committee, formed in June 1973, consists of representatives of the leading professional accounting bodies of Australia, Canada, France, Germany, Japan, Mexico, the Netherlands, the UK, Ireland and the USA, the founder members. There are associate members from 13 other countries. The primary objective of the IASC is to formulate standards to be observed in financial statements. The observance of IASC standards is generally obligatory upon UK accountants whose professional bodies are members of the committee.
2. UEC – Union Européenne des Experts Comptables, Economiques et Financiers. This European body was formed in 1951, with certain of the British accounting bodies joining in 1963. One committee of the UEC has been concerned until recently with the formulation of recommendations on accounting and auditing practices.
3. Groupe d'Etudes des Experts Comptables de la CEE. This body was formed with the objective of consulting members and making representations to the EEC Commission on proposed legislation on accounting and auditing matters. The effective working party of the group is the Bureau Elargi. British accounting bodies joined the Group and the Bureau in early 1972.
4. AISG – Accountants' International Study Group. This group consists of representatives of the British Chartered Institutes, the American Institute of Certified Public Accountants, and the

Canadian Chartered Institute. Its objective is to undertake comparative studies of accounting practices and thought in the participating countries.

Each of the above bodies is concerned with accounting practices and their future development in the UK. The IASC has approved the first International Standard on Accounting Policies and will be pursuing a programme leading to more. The UEC has issued a recommendation on accounting policies and may be expected to issue some further recommendations, although not standards, in the future. The AISG, as an outcome of comparative studies in the UK, USA and Canada, is tending to make proposals regarding best accounting practices.⁵ Changes in the reporting of financial information to shareholders of British companies will be required in the future by EEC legislation. Another complication may be added by a change in attitude on the part of government towards the provision of financial and other information for employees. Further, less direct influences upon British accounting practices are likely to arise from other sources. For example, the Financial Accounting Standards Board is in the process of preparing and issuing standards for application in the USA. In addition, a number of other countries have commenced a process of standardisation similar to that adopted by the ASSC.

This very considerable activity in the field of standardisation carries two dangers. The first is the danger of conflicting recommendations and legislation. The second and, in the author's view, more serious danger, is that the basis underlying the present national and international programme of standardisation is misconceived. The reasons for these views are developed in the following two sections of this paper.

Conflicting standards

There are two potential areas of conflict – internal and external. Within the UK there is no unified accounting profession. The ASSC itself is not an independent committee formed by the major accounting bodies, but a committee of The Institute of Chartered Accountants in England and Wales. There is no certainty that agreed national standards, as proposed by the ASSC, will emerge for all areas of controversy. Even when agreed national standards exist, the possibility arises of external conflict with international standards. Should such a conflict occur, the obligation upon the accountant will be to observe the national standard. The accountant will also,

however, be required to disclose non-compliance with the international standard; or state the extent to which the accounts do not comply.⁶ Thus, situations could occur which show that British accounting practices are out of step with those applied internationally. More seriously, an international standard could conceivably emerge and be applied in the UK before the definition of a national standard. If the subsequent national standard differs from the previously applied international standard, then a change in accounting practice would follow. Lay readers of the accounts (including many company managements) are not likely to appreciate such situations.

The credibility of financial statements would be reduced if conflicting standards were to come into existence. Different attitudes of accountants and company management towards individual standards would further compound the problem. For example, suppose a company departed from a national standard, and the auditor disagreed with the departure, yet the company conformed with an international standard. How credible then would the accounts be? The size of the problem is indicated if we then introduce a further level of EEC Directives, and the possibility of standards varying from one professional body to another. The possible combinations of differing standards are too numerous to detail. One example is given as an indication of the potentially absurd situation facing the profession. On any one topic, the following could exist: a Scottish Standard; an English Standard; an International Standard; an EEC Directive; the auditor's view; and the company directors' own views. Introduce further topics for which standards have been defined, and the number of possible interpretations of profit and loss and financial position becomes immense.

Clearly, if such situations arise, neither shareholders nor society at large will be able to place much faith in the professional work and expertise of accountants. The effect is likely to be one of increasing public disquiet, and a lowering of the status of the profession. A prime cause of the present confused situation is the failure of the profession to define clearly its aims and objectives.

Misconceptions in the present approach to standardisation

There are probably few people who disagree in principle with the need for the accounting profession to do something to improve the quality of financial

⁵See, for example, *The Funds Statement*, AISG, 1973, para. 104, and also *Accounting and Auditing Approaches to Inventories in Three Nations*, AISG, 1968, para. 100.

⁶The Institute of Chartered Accountants of Scotland, 'Commentary on the Statements of International Accounting Standards', *The Accountant's Magazine*, March, 1974, paras. 9 and 3(b)(i) and (ii).

reporting. In this respect there appears to be a general acceptance of the need for the ASSC and for accounting standards. Controversy may exist over proposed standards, but there does not appear to be widespread opposition to the present approach to standardisation in either the national or international context.

This is surprising, as one would intuitively expect accountants, who, in their daily lives are concerned with the orderly and logical treatment of quantitative data, to be both orderly and logical in their approach to improving the quality of published financial accounts. Regrettably, this does not appear to be the case. Instead, the ASSC have plunged headlong into a programme of establishing uniform accounting methods. The programme is based upon an unquestioned acceptance of the historically derived framework of accounting, i.e. stewardship orientated historic cost accrual accounts, with the examination of perceived accounting problems on an arbitrary *ad hoc* basis. This is somewhat akin to the brushfire approach to management, whereby action is taken on a succession of problems as and when discovered. Solutions which appear to extinguish the fire are adopted and management then concentrate upon the next question at issue. Unfortunately, this approach frequently results in devising solutions for the outwardly manifest symptoms of a basic problem, and not for the problem itself. The lack of a scientific approach to the identification, definition, examination and solution of problems, may not only result in a concentration upon symptoms, but also in a failure to recognise that apparently dissimilar symptoms may spring from a common cause.

To command the long-run confidence of users of financial accounts, it is essential that changes in accounting practices be based upon a pre-existing identified and defined goal. This requires answers to the following two questions:

1. For whom are the accounts prepared and published?
2. What are the objectives of the accounts?⁷

⁷In the USA, The Institute of Certified Public Accountants commissioned in 1971 the Trueblood Study Group, to report on the objectives of financial reporting. The group suggested that the primary objective of financial reporting is to provide information to users for purposes of predicting, comparing and evaluating the potential cash flows and earning power of the enterprise. See 'Objectives of Financial Statements', *Report of the Study Group on the Objectives of Financial Statements*, Institute of Certified Public Accountants, March 1972. See also, George J. Staubus, 'The Measurement of Assets and Liabilities', *Accounting and Business Research*, No. 12, Autumn 1973, pp. 243-262, for a statement of set of criteria to be used by accountants in choosing measurement methods, and an analysis of measurement methods.

Carsberg, Hope and Scapens have concluded:

'... that little progress can be made toward agreement on best methods of preparing such (accounting) reports until the objectives are made explicit and related analytically to the choice of method. The chosen objectives must emphasise the decisions which will be taken on the basis of the accounting information - for information is strictly valueless unless there is some chance that it will influence future actions.'⁸

This conclusion is reinforced by Bird, who states: 'Thus the objective of financial reporting must be to provide financial data which are relevant to decisions faced by recipients of the report.'⁹

The failure of the ASSC to examine the above questions raises doubts as to the whole validity of their present approach. If changes in accounting practices are not based upon a fundamental recognition of the purpose and objectives of accounting, then the quality of financial reporting is unlikely to be significantly improved.

A normative approach demonstrates the inefficacy of the course of action adopted by the ASSC. There are a large number of potential users of published financial statements. Whether it is the function of the accounting profession to provide information to satisfy the informational needs of all interested persons is open to question. If, however, accounting reports are to be of significant value, they should at least aim to fulfil the informational needs of the prime user. It may be postulated that the prime user of published financial statements is the investor, i.e. the owner or potential owner of ordinary shares, whether acting as an individual or as an investment manager. The investor is presumably primarily interested in the use of financial information as an aid to his investment decision. For each possible investment, the investor is likely to wish to make a comparison between his own subjective assessment of the current worth of a share, and the current

⁸Bryan Carsberg, Antony Hope and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, No. 15, Summer, 1974, p. 173. See also K. V. Peasnell, 'The Objectives of Published Accounting Reports: A Comment', *Accounting and Business Research*, No. 17, Winter 1974, pp. 71-76, and Carsberg, et al., 'The Objectives of Published Accounting Reports: Reply to a Comment', *Accounting and Business Research*, No. 18, Spring, 1975, pp. 152-156.

⁹See Peter Bird, 'Objectives and Methods of Financial Reporting: A Generalised Search Procedure', *Accounting and Business Research*, No. 19, Summer, 1975, who also suggests an approach to the development of financial reports relevant to the decisions faced by users in various types of organisation. See also, Robert R. Sterling, 'Decision Oriented Financial Accounting', *Accounting and Business Research*, No. 7, Summer, 1972, p. 198.

market price. The investor's subjective assessment of current worth is likely to be dependent upon expectations of future benefits in the form of dividend flows. In addition, the investor's attitude towards risk will influence his decision. The risk of an investment relates to the likely variability of future dividend flows. The variability of dividend flows will be a function of business risk, i.e., the variability of future investment flows of the company, and financial risk. Financial risk includes the potential variability of dividend flows due to the company's financial structure.¹⁰ In addition, the investor is likely to wish to receive financial information to fulfil the traditional stewardship function. However, the investor may be thought to be interested not only in management's past handling of the resources of the company, but also in its future plans and intentions. Stewardship information therefore relates to the past and the future.

With the exception of historic information required to fulfil the traditional stewardship function, the investor's presumed needs relate to information regarding the future. Ideally, it appears that the ASSC should be concentrating upon the provision of forecast rather than historic data. It is, however, questionable as to whether the responsibility for forecasting, or even checking forecasts made by other groups, lies within the province or competence of the accounting profession. Furthermore, little is known about the state of the art of forecasting in practice. Indeed, some studies raise doubts about the ability of companies to forecast accurately,¹¹ and renders uncertain the likely value of individual company forecasts to investors. While it is necessary to bear in mind the need of investors for forecast information, it is probably reasonable to recognise that practical considerations rule out the provision of quantitative forecasts in the immediate future.

The value of changes to the present system of financial reporting must therefore be assessed on the basis of the extent to which they improve the historic data base for the investor's own subjective estimate of the future. Allied with this, is the extent to which the investor is assisted in choosing between alternative investment possibilities by the making of improved inter-firm comparisons.

The case for the present programme of standardisation is superficially strong. That companies may treat

similar transactions in markedly different ways, thereby affecting the measurement of profit and net asset value, and making inter-firm comparisons difficult, is *prima facie* wrong. It is tempting to assume that, by standardising and applying uniform accounting methods, the solution to the problem will be found. However, this is a treatment for the symptom, not the underlying problem. The problem is the provision of *relevant* and *useful* financial information for investors. The ASSC has ignored the issue of relevance, and therefore the need to supply financial information specifically designed to assist the investor with his investment decision. Instead, the ASSC has perceived the problem to be one of flexibility of accounting practices, with standardisation and uniformity as the solution.

Complete uniformity of accounting practices is impracticable, given the wide diversity of business activities. This is even recognised by the ASSC.¹²

Furthermore, there is a considerable problem in devising standards for controversial topics, as evidenced by the considerable debate on the proposed standard for inflation accounting.¹³ It is probable that the need to arrive at a consensus viewpoint will result in the acceptance of what represents the lowest common denominator of agreement; a solution which satisfies no one. Even if it were considered feasible to derive generally applicable national and international standards, their value would be almost completely diminished by their use within the framework of the accrual accounting system.

Financial accounting under the accrual system is a mixture of objectively measured historic cost data and subjective judgement. Distinctions have to be drawn between capital and revenue expenditure, and judgements made as to the valuation of stocks, the creation of provisions, and the depreciation of fixed assets. Even if the ASSC were to establish a standardised method of, say, depreciation accounting, two identical companies would still be likely to report different estimates of depreciation expense, profit and loss, and balance sheet value. All that would be required is for management to make different assessments of asset life and residual value. Standardisation of accounting methods attempts to solve one aspect only of the general problem of quantification. The other aspect, which involves predicting the future, is incapable of satisfactory solution by the imposition

¹⁰For an analysis of the relationship between dividends and share price, and of risk, see, for example, A. A. Robichek and S. C. Myers, *Optimal Financing Decisions*, Prentice-Hall, 1965, Chapters IV and V.

¹¹See, for example, Susan Dev and Michael Webb, 'The Accuracy of Company Profit Forecasts', *Journal of Business Finance*, Vol. 4, No. 3, Autumn, 1972, pp. 26-39.

¹²The Institute of Chartered Accountants of Scotland, Statement of Standard Accounting Practice, *Disclosure of Accounting Policies*, November, 1971, para. 12.

¹³This is evidenced by the formation of the Sandilands Committee. See also Reg. S. Gynther, 'Why Use General Purchasing Power?', *Accounting and Business Research*, No. 14, Spring, 1974, pp. 141-156.

of fixed rules. If the investor is unable to differentiate between factual data and subjective judgement in standardised financial accounts, then his ability to use the information provided will not be markedly improved. In this context, therefore, standards do not appreciably diminish the element of subjectivity in financial statements.

The current programme of the ASSC and other international bodies may be expected to do little to improve the quality of financial statements for the investor's decision-making purposes. A different approach is needed.

Cash flow reporting as an alternative to standardisation

Each of the presumed informational requirements of the investor, postulated in the previous section, relates to the need for cash flow data. Anticipated dividend payments will become cash flows. The ability of the company to meet future financial obligations will be dependent upon cash flows. Changes in financial structure will be determined by the organisation's future needs for cash, and stewardship information essentially reduces to the need to assess the past and future handling of the cash resources of the company by management. A clear *prima facie* case exists for the provision of cash flow information.

This proposition is not new. Cash flow reports have been suggested by other writers, notably Edey,¹⁴ Lawson,¹⁵ Briston and Fawthrop,¹⁶ and Lee.¹⁷ What is perhaps surprising is that the case needs restating due to the failure of the ASSC and the accounting profession to consider the proposition seriously.

For changes in the system of financial reporting to be effective they must, so far as is practicable, satisfy the informational requirements of the user of the information – in this case the investor. Only if this criterion is met can any change be justified.

That the primary interest of the investor lies in forecasting cash flows appears by itself to be a more than sufficient reason for its introduction to financial

¹⁴H. C. Edey, 'Accounting Principles and Business Reality', in *Readings in Modern Financial Management*, (editors Carsberg and Edey), Penguin, 1969, pp. 21–49.

¹⁵G. H. Lawson, 'Cash Flow Accounting', *The Accountant*, October 28th, 1971, pp. 586–589, and November 4th, 1971, pp. 620–622.

¹⁶R. J. Briston and F. A. Fawthrop, 'Accounting Principles and Investor Protection', *Journal of Business Finance*, Vol. 3, No. 2, Summer, 1971, pp. 10–19.

¹⁷T. A. Lee, 'A Case for Cash Flow Reporting', *Journal of Business Finance*, Vol. 4, No. 2, Summer, 1972, pp. 27–36. See also, T. A. Lee, 'Enterprise Income: Survival or Decline and Fall?', *Accounting and Business Research*, No. 15, pp. 190–192.

reports. Cash is the basic resource of the company, which determines its ability to pay dividends; to invest; to meet its financial obligations; and ultimately to survive as a business entity. In addition to its basic importance to both the company and investors, additional benefits may be claimed for the provision of historic cash flow data.

Historic cash flows represent definite events, which can be objectively measured, verified and reported. Unlike accrual accounts, they do not require subjective value measurements in respect of incomplete transactions. Cash flow statements would, therefore, be free from the biases introduced by accrual accounting valuations. Inter-firm comparisons would also be aided, as all the comparative data would be prepared and published on an identical basis. Moreover, the introduction of such statements does not require radical changes to the existing system for the recording and publication of financial data. The basis for both forms of reporting is the same, and it should be relatively simple to compile and publish cash flow statements in addition to the financial data presently required by statute. Furthermore, the cost of their preparation and publication is unlikely to be high, which contrasts with a much higher probable cost for the present programme of standardisation.

It may be suggested that historic cash flow statements would provide useful additional data to fulfil the traditional stewardship function of accounting. The prime justification for their publication, however, is that their availability would improve the data base for predictive purposes, and their use result in improved investment decisions. Whether this would be the case has yet, for obvious reasons, to be proved empirically. It is nevertheless possible to examine certain objections to the publication of historic cash flow statements, and to place their use within a general framework of information availability.

When making predictions it is clearly unsafe to assume that what has happened in the past will be repeated in the future. Thus all historic information must be used with care, as the simple extrapolation of past performance to form a prediction will ignore both the unusual or exceptional historic results, and changes in circumstances which may make past results untypical of likely future performance.¹⁸ This basic problem, well known to those engaged in forecasting, can be extended further by questioning whether the best predictor of a variable is a series of historic values of that same variable. For example, if

¹⁸For a comment on the problem of discerning trends from historic cash flows, see G. Whittington, 'Asset Valuation, Income Measurement and Accounting Income', *Accounting and Business Research*, No. 14, Spring, 1974, p. 99.

you wish to predict the cash flows of a company manufacturing refrigerators, would it be best to use historic cash flows as the data base; a demand estimate for the product; or something else? The likely answer to such a question is that no single variable will be sufficiently powerful to serve as the sole basis for forecasting. Instead, a variety of sources of information will be needed to form a predictive base. What is suggested here, is that historic cash flow statements are likely to form an important and useful constituent of the predictive base. This is, moreover, an element of such a predictive base that the accountant is well able and equipped to supply.

It is likely that the utility of such cash flow statements would be further improved by such measures as:

- 1 the publication of a series of yearly historic cash flows, differentiating not only between trading, non-trading and exceptional flows, but also between capital and investment flows;¹⁹
 - 2 the publication of explanatory statements of managerial intentions and assumptions regarding the future.
- Areas on which it appears desirable that such statements should be made are as follows:
- 1 Trading Activities
 - 2 Investment Policy
 - 3 Dividend Policy
 - 4 Financing Policy
 - 5 Social and Economic Assumptions
 - 6 Prior Years - differences between previously published expectations and actual results.

Given the likely benefits to the investor of cash flow reports, why have the ASSC and the accounting profession in general failed to consider their introduction? A possible reason is a general unwillingness on the part of accountants to look outside the narrow confines of their professional training, with its strong emphasis upon accrual accounting. In the early stages of accounting development, the accrual system may well have been able to cope satisfactorily with the relatively simple situations faced by the owner and manager. The system is, however, no longer adequate when related to the complex activities of present-day business organisations. It is necessary to revert to the measurement and reporting of that with which economic entities are directly concerned -

the earning and utilisation of cash.

Conclusion

The formation of the ASSC represented an opportunity for the accounting profession in the UK to re-assess their role and function as providers of financial information. Regrettably, far from seizing this opportunity, the ASSC has seen fit to accept without question the traditional framework of accounting, and has directed its attention towards codifying and standardising historic cost accrual accounting practices. The ASSC has not even investigated and defined the fundamental objectives of accounting, without which any programme of change is likely to be irrelevant. This failure is still further compounded by the formation of the IASC, which has adopted a similar approach to the question of standardisation, and by the existence of numerous other international bodies concerned with accounting practices.

Before the profession is irreversibly committed to an inappropriate programme of development, the ASSC should halt its current activities as a necessary precursor to the identification and definition of accounting objectives. Once established, these objectives would form a scientific basis for the institution of a rational programme of change. Whilst not providing a panacea for all the ills of accounting, it is suggested that a cash flow approach to accounting development represents a fruitful field of activity. Developments in other directions will also be required. For example, the investor is presumably interested in receiving financial information as a basis for assessing the effectiveness of management. In its fullest sense, this means not just information to assess what the company has done or is going to do, but in addition what has not or will not be done, i.e. information to assess alternatives foregone and therefore opportunity costs. The efforts of the ASSC and the accounting profession to devise accounting standards represent a waste of resources which could be better applied in other directions. They are likely to be more productive if directed towards a fundamental re-appraisal of the objectives of accounting, and an unbiased assessment of the merits of cash flow reporting.

Acknowledgement

I wish to thank Professor T. A. Lee and Professor G. Whittington for their constructive criticisms of a first draft of the paper.

¹⁹For an example of the format such statements could take, see T. A. Lee, 'A Case for Cash Flow Reporting', *Journal of Business Finance*, Vol. 4, No. 2, Summer, 1972, pp. 32-35.

Accounting Information: An Investigation of Private Shareholder Usage

T. A. Lee and D. P. Tweedie

Introduction

It is generally recognised that information contained in company financial reports should be useful to shareholders in their investment activities.¹ The present criticism of accounting practices, and the widespread recognition of the need to standardise accounting methods stem basically from a desire to ensure that reported information will, in future, give investors a more realistic portrayal of the economic progress and position of the business enterprise than is presently the case.

Yet improved accounting practices are not enough. If financial reports are to succeed in being a primary means of communication between the business enterprise and its shareholders, they must be both read and understood by them. If either of these two conditions are not met, then the shareholders could fail to perceive the underlying economic condition of the company (with the possibility of harmful results both for themselves and for the company). They may also, as a result, seek information from other sources.

The present study is intended to examine whether or not shareholders do, in fact, use information from company financial reports and whether or not they understand the statutory regulations and accounting conventions underlying the production of these reports.

This paper is the first of two based on evidence obtained from a limited survey of shareholders, conducted in December 1974, and reports on the use

made of sources of financial information by such investors. The remaining paper will examine the respondents' understanding of the role of financial reports and of certain accounting conventions used in their preparation.

Research methodology

Due to time and cost constraints, and in order to obtain the views of as many shareholders as possible, it was decided to conduct the survey by means of a postal questionnaire. The results obtained by this study are, however, being followed up in an interview survey of the shareholders of one of the largest UK industrial companies.

Shareholders were identified from the share register of a nationally-known London-based engineering company. The register contained 1,974 share holdings and after the elimination of the institutional shareholders (who will be investigated fully in the interview-based study), 1,782 individual holdings remained, consisting of approximately 30% of the company's issued share capital. These share holdings were further reduced to 1,594 by the elimination of shareholders living outside the United Kingdom, nominee holdings, executors of estates, and holdings by more than one person at one address. Questionnaires were then sent to these remaining shareholders and 374 usable replies were received in time for processing – a response rate of 23.5%.

While the sample obtained cannot be claimed to be truly representative of individual shareholders, since there is inevitably a suspicion that the non-respondents may have widely differing views from those returning the questionnaire, the results do give insights into the use made of company financial reports by shareholders.

The first part of the paper considers the interest shown by the respondents in the company's annual financial report. Other sources of information, and the use made of them by the respondents, are dis-

¹See, B. Carsberg, A. Hope and R. W. Scapens, 'The Objectives of Published Accounting Reports', *Accounting and Business Research*, Summer 1974, pp. 162–73, who present evidence to show that, while the traditional stewardship objective of accounting remains widely acknowledged as important, there appears to be a growing consensus that the provision of information to assist shareholders with their investment decisions should be recognised as a second important objective of financial reports.

cussed in the second part. The paper is primarily concerned with the question of the extent to which each source of information is used by shareholders, and does not attempt to discuss the pattern of information sources used by the individual shareholder. The analysis of data is consequently of a univariate nature; the results of multivariate analysis will be presented in a later report.

Shareholders' use of annual financial reports

Interest in the reports

Table 1 reveals which particular sections of company annual financial reports are read by the respondents.

The data below indicate a pattern of user attention to annual reports which may well be surprising to the reader. For example, the chairman's report appears to be the most widely read part of the annual report. It is read by 95.7% of the respondents – a figure almost nine percentage points higher than the percentage of the shareholders reading the profit and loss account. The balance sheet and directors' report were examined by approximately three-quarters of the respondents, but only one-third read these statements thoroughly. Indeed, the general impression given by Table 1 is that most of these shareholders merely skim through the annual report – only one statement, the chairman's report, being read thoroughly by more than half of the respondents (only 31 respondents read all sections of the report

thoroughly and only 11 read no sections). Few of the shareholders admitted to undertaking any further analysis of the available data. Only 8.3% claimed to standardise profit and loss account data in order to produce financial ratios and other indicators of company performance, and a similar percentage (7.2%) analysed balance sheet data.

While the results described so far may not be rewarding for the reporting accountant, other aspects of Table 1, if verified by further research, have disquieting implications. More than two-fifths of the shareholders claimed that they do not read the auditor's report. While most auditors' reports are of a standard unqualified nature, confirming that a true and fair view is shown in the financial statements, the fact that a qualified report could remain undetected by the individual private shareholder is rather alarming. Only 44.9% of those who read the balance sheet thoroughly, and even fewer (34.5%) of those paying similar attention to the profit and loss account, read the auditor's report with equal attention. It may well be that shareholders know that the financial statements have been audited, and that this is enough to satisfy them that the information contained in them does show a true and fair view of the profitability and financial position of the company. (Another possibility is that the shareholder merely glances at the report to ensure that it is unqualified but does not consider the brief look at the report sufficient to claim that it has been read in detail by

TABLE 1
Aspects of company financial reports read by shareholders

	<i>Read thoroughly</i>	<i>Read briefly for interest</i>	<i>Not read at all*</i>	<i>Total n=374</i>
	%	%	%	%
Chairman's report	51.6	44.1	4.3	100.0
Profit and loss account	46.5	40.4	13.1	100.0
Directors' report	36.0	43.3	21.7	100.0
Balance sheet	34.0	41.7	24.3	100.0
Notes to accounts	29.4	36.4	34.2	100.0
Statistical data	26.5	37.1	36.4	100.0
Auditor's report	17.4	39.0	43.6	100.0

*Included in this column are respondents who failed to answer the question which asked whether or not they read the particular part of the annual report. The rank correlation between the 'do not read' answers and no answers for the seven parts of the report was extremely high (0.88). In comparison with the other two responses, the 'no answers' showed an inverse relationship.

him.)

However, further evidence that the accounts are taken at face value is revealed by the finding that more than one third of the shareholders do not read the notes to financial statements which describe the composition and, frequently, the method of calculation of many of the items shown on the face of the statements. Clearly, in view of the many differing income calculations possible under traditional accounting practice, it would appear to be essential for a shareholder to examine the supporting notes to ensure that previous practices had been maintained and to note the effect of items, which while not necessarily being classed as extraordinary, could make a material difference to the measurement of company income, assets and liabilities. Only 58.0% and 68.5%, respectively, of those reading the profit and loss account and balance sheet thoroughly, took similar care in reading the notes to these statements.

Shareholders from different backgrounds used published financial statements in rather different ways. Looking at the items in annual reports which were examined most thoroughly by the respondents, qualified accountants appeared to be more interested than the non-accountants in the profit and loss account data; 76.9% of accountants read this section of the report thoroughly compared to 65.4% who examined the chairman's report to the same extent. Similarly of those involved in financial management, 67.1% read the profit and loss account thoroughly compared to 60.0% giving the chairman's report the same degree of attention. (For details of the respondents' backgrounds, see Appendix 1.) At the other end of the continuum of accounting experience, however, shareholders were more interested in the chairman's report than the profit and loss account; 43.1% of those with no accounting experience read the chairman's report thoroughly, a figure eight percentage points higher than those considering the profit and loss account in equal detail. Those with only book-keeping experience also paid most attention to the chairman's report. In this case, 59.3% of the group read the chairman's remarks carefully, whilst considerably fewer (42.4%) paid similar attention to the profit and loss account.

The balance sheet was the third most widely read section of the annual report for all groups with the sole exception of the respondents who were accountants, who paid the same degree of attention to both the balance sheet and the chairman's report. Few of the accountants and respondents with experience in financial management (henceforth referred to as financial managers) omitted to read the balance sheet and the profit and loss account but, among those with no knowledge of accounting, as many as 20.2%

ACCOUNTING AND BUSINESS RESEARCH

were apparently not sufficiently interested to read the profit and loss account, and no fewer than 31.9% neglected the balance sheet.

The auditor's report was the least thoroughly read piece of information. Indeed, 52.2% of the shareholders without any accounting experience did not study it at all, and even 38.4% of the qualified accountants did not apparently consider it important enough to examine. The notes to the accounts, however, received more attention from qualified accountants and financial managers; only 11.5% and 20.0% of the two groups, respectively, failed to read this section of the report. In contrast to this, 44.2% of those without accounting experience did not study the notes at all. Thus, it appears that a large proportion of the investing public could be taking what they read in the published financial statements at face value. Alternatively, the complexity of the messages contained in these notes may prevent them using such data. This point, in fairness, is also applicable to other parts of company financial reports, and will be examined in the second paper related to this study.

Only a few differences between the other responding groups were noticeable. Men paid more attention to financial statements than did women (especially housewives); and the under 31 age group tended to read the reports more thoroughly than did older shareholders (it should be remembered, however, that only 16 respondents were under 31 years of age). Otherwise, the pattern in each group was similar.

The perceived importance of the reports

While shareholders may read sections of the annual report thoroughly, they may examine these sections more out of interest than from a desire to determine the company's financial position and prospects prior to making an investment decision. Consequently, the shareholders were asked to indicate which parts of the company annual financial report they allow to influence their decisions to buy, sell or hold shares, and the extent to which each part is such an influence. The respondents were presented with the same seven sections of the annual financial report as shown in Table 1, and asked to rank each on a five point scale of importance, as follows: 1 = maximum importance; 2 = great importance; 3 = moderate importance; 4 = slight importance; and 5 = no importance. The means of the respondents' answers are shown in Table 2 below.

It can be seen from the table that, while more shareholders read the chairman's report more thoroughly than the profit and loss account, the latter statement is considered by the respondents to be more important for investment purposes. Indeed, 52.8%

of the shareholders rated the profit and loss account as being at least of great importance (categories 1 and 2 above) and 30.7% rated it as being of maximum importance. In comparison, the figures for the chairman's report were 44.3% and 27.0%, respectively. The profit and loss account and the chairman's report were the only two sections of the report to fall into the great to moderate importance category. All other sections of the annual report were rated, with a wide variation between the sections, as being of moderate to slight importance. The balance sheet just fell into this category largely because, although 42% of the respondents felt that the balance sheet was of, at least, great importance,* 30.7% of the shareholders considered it to be of no importance whatsoever for investment decision making.†

Most of the other sections of the report were considered by a large proportion of the respondents to have no relevance for investment decision making. For example, over one third considered the directors' report to be of no importance; over two fifths of the sample considered the notes to the accounts and the statistical data to be irrelevant; and half of the shareholders stated that the auditor's report could be ignored in any investment decision.

It appeared, therefore, that a relationship existed

between reading sections of the annual report and the importance of the section to the shareholder for decision making purposes. As would have been expected, certain types of shareholders rated the various sections of the annual report more highly than others. (See Appendix 2 for full details.) The shareholders with the most knowledge of accounting considered the sections of the report to be of much more importance than did those with no form of training in accounting or book-keeping - the qualified accountants and financial managers awarding the profit and loss account the highest rating for any section given by any group of respondents (rating 2.04 and 1.91, respectively). Moving along the continuum of accounting sophistication, the number of sections of the annual report rated as being of great to moderate importance fell (the auditor's report and notes to the accounts being rated in the slight to no importance category by those respondents with no accounting experience of any kind), and the chairman's report tended to replace the two major accounting statements as the most important item. This is not unduly surprising as such a report would be more comprehensible to the layman than would the profit and loss account or balance sheet but, again, it illustrates the dominant position of the chairman's statement to a large proportion of the responding shareholders.

The cross-tabulation of the importance of each section with the other characteristics of shareholders revealed some tendencies similar to those shown by the reading patterns of the various groups of respondents. Men rated the statements more highly than

*20.7% of the shareholders believed the balance sheet to be of maximum importance.

†Only 20.7% and 18.2% of the respondents held similar views about the profit and loss account and chairman's report, respectively.

TABLE 2
Shareholders' views on the importance of sections in the annual report

<i>Rank</i>	<i>Statement</i>	<i>Mean *</i>	<i>Standard deviation</i>
<i>Of great to moderate importance</i>			
1	Profit and loss account	2.66	1.50
2	Chairman's report	2.76	1.43
<i>Of moderate to slight importance</i>			
3	Balance sheet	3.07	1.54
4	Directors' report	3.49	1.37
5	Notes to the accounts	3.69	1.35
6	Statistical data	3.72	1.36
7	Auditor's report	3.94	1.33

*Respondents who did not answer a particular part of this question were deemed to have considered that section of the report to be of no importance. The rank correlation between 'no answers' and 'no importance' was 0.99. All other categories of response with only one exception (of slight importance) were inversely related to the 'no answers'. 22 respondents did not answer any sections of this question and have been omitted from the analysis.

women, but the over 65s rated all sections of the annual report more highly than did the younger respondents (with two minor exceptions). These results were confirmed by the low importance ratings given by housewives and the relatively high degree of relevance attached to the various sections by shareholders who had retired from full-time employment.

To sum up, it would appear that while the profit and loss account is rated to be the most important aspect of the company annual financial report in general, different groups of the responding shareholders (especially the less well-informed) rely heavily upon the chairman's statement to obtain information for decision making purposes. There could, of course, be two main reasons for this. Firstly, the less numerate shareholders, and those with little knowledge of accounting practice, may look to the chairman's report to escape from the possibly baffling array of figures presented in the accounting statements or, secondly, these shareholders may be looking for information not revealed in the profit and loss account and balance sheet, but which they perceive as being useful to them for decision-making purposes. Consequently, it was decided to ask the shareholders an open-ended question on what particular pieces of information contained in the various parts of company annual financial reports they found to be useful when they made their investment decision.

Useful information found in the company annual financial report

Table 3* shows the major groups of responses and shows clearly the desire of over one third of the shareholders to obtain information about the company's future prospects.†

The magnitude of the difference between this form of information and the next most useful piece of information in the annual financial report (fifteen percentage points) illustrates the strength of the need for some guide to a company's prospects.‡ Indeed, several other shareholders were also interested in the

*71 shareholders did not answer this question.

†19.0% of the total respondents stated that the information was of maximum importance for investment decision making and a further 12.8% felt that it was of great importance.

²See, H. K. Baker and J. A. Haslem, 'Information Needs of Individual Investors', *The Journal of Accountancy*, November 1973, pp. 66-67, who showed that of 33 factors used in investment analysis, four of the six rated as being most important by 851 individual investors were future or expectational factors.

TABLE 3

Information found in the annual financial reports found to be useful by the shareholders when making investment decisions

	%
Future prospects of the company; the order book	36.4
Income information (current profits; trend of profits)	21.4
Solvency; liquidity	16.3
Sales (home and overseas) <i>excluding</i> future sales prospects	11.0
Dividend information (cover; amount; trend)	10.4
Investment guides (earnings per share; earnings yield; price earnings ratio; return on capital)	10.4
Directors' holdings; directors' remuneration; changes in board	7.2
Company development and expansion (capital investment; mergers)	7.0
Company borrowings (long term capital; bank borrowings)	4.3
n=374	

investment plans of the company, which also indicates a desire for facts about the company's future income generating potential.†

The other items mentioned are the more conventional pieces of information which are required to be disclosed by law, or which can be identified easily from the annual report by the trained analyst and the experienced layman. Information about the company's prospects, however, does not have to be shown and, if mentioned in the annual report, may be extremely limited. The usual position for such information is, of course, in the chairman's report and it was therefore not surprising to discover that 63.2% of those who believed that an indication of the company's future prospects was useful for investment decision making also found the chairman's report to be of great or maximum importance.‡‡

†In total, 40.9% of the respondents mentioned one or other of these two areas of desired information.

‡‡As stated above, only 44.3% of the total sample rated the chairman's report as highly. 37.5% of those who found information on the company's future prospects to be useful also stated that the chairman's report was of maximum performance, while an additional 25.7% of these respondents considered it to be of great importance. Only 8.1% considered the chairman's report to be of slight or no importance.

56.6% of those interested in the future prospects of the company also found the profit and loss account to be of similar importance.* These statements, however, were the only sections of the annual report which more than half of those interested in the future prospects of a company believed to be of (at least) great importance, possibly indicating that these two sections were perceived by the shareholders as containing most of the information about the future prospects of the company.

Not unexpectedly, information about profit trends and current profits appeared to be sought mainly from the profit and loss account: 72.5% of those stating that information about the company's profits was useful for investment decision making also felt that the profit and loss account was of maximum or great importance. Surprisingly, however, only 16.3% of these respondents considered the statistical data, which often shows the trend of profits over several years, to be of similar importance.

The analysis and comparison of the respondents' views on the pieces of information which they considered to be useful for investment purposes with their backgrounds revealed few differences. The shareholders who were qualified accountants or financial managers were, however, more interested in both the solvency (27.1% of these respondents mentioned solvency) and the income flow pattern of the company (mentioned by 29.2%) than the respondents who had little or no training in accounting. Of these shareholders, only 10.5% and 17.0% mentioned

*52.8% of the total sample rated the profit and loss account as being of maximum or great importance.

the solvency or income data, respectively, as being useful information for investment purposes.

Shareholders' use of other sources of financial information

Interest in other sources of financial information

Turning from the annual financial report to other sources of financial information for shareholders, it can be seen from Table 4 that financial press reports are used by more shareholders than any of the other four pre-selected sources of information presented to the respondents.

Indeed, relatively few of the responding shareholders appeared to neglect the financial pages of the press in their search for information. The respondents appeared to pay slightly more attention to this source of information than to even the chairman's annual report. Perhaps rather surprisingly, occasional merger reports appeared to be the next most popular source of financial information, being read more thoroughly than either interim reports or stockbrokers' reports. The element of change and topical interest inherent in a merger report may well be the incentive to study it more closely than these other sources of information which portray a relatively more static position. Interim reports from the company also appear to interest shareholders; only one respondent in five failed to read these reports and almost two in every five read them thoroughly.

Considering the more specialised sources of information, it can be seen from the above data that stockbrokers' reports are used by a great many shareholders (11.0% of the respondents stated,

TABLE 4
Use made by shareholders of other sources of financial information about companies

	<i>Read thoroughly</i>	<i>Read briefly for interest</i>	<i>Not read at all*</i>	<i>Total n=369†</i>
	%	%	%	%
Financial press reports	52.4	38.8	7.5	98.7
Occasional merger reports	39.8	42.2	16.6	98.7
Half yearly financial reports	38.2	41.4	19.0	98.7
Stockbrokers' reports	31.0	33.2	34.5	98.7
Moodies' or Extel cards	14.2	6.7	77.8	98.7

*Included in this column are respondents who failed to answer the particular part of this question. The rank correlation between the 'do not read' answers and 'no answers' for the five sources of information was unity. The other two categories of response revealed a negative correlation with the 'no answer' rankings.

†Five shareholders failed to answer any part of the question and have been omitted from this analysis.

without being asked, that they left their share investment decisions entirely to their stockbroker) but the details provided by Moodies' handbooks and Extel cards were not utilised by most shareholders in appraising the merits of various sections of their portfolios.

A few differences were noted in the interest shown in these sources of information by different types of shareholders. Women tended to read all such sources less thoroughly than did men. Shareholders who had retired read interim reports and merger reports more intensively than other groups still in employment. The most striking comparative differences in reading pattern, however, were observed in the group of shareholders without any training in accounting. Whereas almost half of all other groups with different degrees of accounting sophistication read six-monthly financial reports thoroughly, only 28.7% of those with no training in accounting did so. Indeed, 25.5% admitted that they did not study these reports at all. A similar though not quite so pronounced lack of study of the financial press and merger reports was also observed in this group in comparison to the others.

Perceived importance of other sources of financial information

Again a check was made to ascertain whether reading of the reports was related to their perceived importance for investment decision making. The respondents were, therefore, asked to rate each of the five sources of information on the same five point

importance scale as had been used previously. The results are shown in Table 5.

The striking feature of this table is the importance given to financial press reports - higher than for any section of company annual financial reports. Topical data about the company can obviously be obtained by the shareholders from newspapers. The production of the annual report is bound to result in much of its information being outdated. Several studies have produced evidence to confirm this.³ It would appear that while the annual report may give a composite picture of the company's progress in the last financial year and the chairman's views of the future, the financial press conceivably gives a better guide to the shareholder for investment decisions. The profit and loss account, however, is obviously considered to be very useful for decision making purposes, despite its historical nature,⁴ since almost the same proportion of shareholders considered the profit and loss account (52.8%) and financial press reports

³See, for example, R. Ball and P. Brown, 'An Empirical Evaluation of Accounting Income Numbers', *Journal of Accounting Research*, Autumn 1968, pp. 159-77; and G. J. Benston, 'Published Corporate Accounting Data and Stock Prices', *Empirical Research in Accounting: Selected Studies*, 1967, pp. 1-54.

⁴See, W. H. Beaver, 'The Information Content of Annual Earnings Announcements', *Empirical Research in Accounting: Selected Studies*, 1968, pp. 67-92, who stated that the share price and volume reaction on the announcement of reported earnings indicated that investors look directly at these earnings and do not use other variables to the exclusion of annual reported earnings.

TABLE 5
Shareholders' views on the Importance of other sources of financial information about companies

Rank	Source of Information	Mean *	Standard deviation
<i>Of great to moderate importance</i>			
1	Financial press reports	2.60	1.24
<i>Of moderate-to slight importance</i>			
2	Stockbrokers' reports	3.22	1.47
3	Half yearly financial reports	3.41	1.40
4	Occasional merger reports	3.47	1.30
<i>Of slight to no importance</i>			
5	Moodies' or Extel cards	4.42	1.16

*Respondents who did not answer a particular part of this question were deemed to have considered that section of the report to be of no importance. The rank correlation between 'no answers' and 'of no importance' was 0.60. The correlation between the 'no answers' and the other importance ratings ranged from 0.0 to -1.0.

21 respondents failed to answer any part of the question and have been omitted from the analysis.

(51.0%) to be of maximum or great importance. Indeed, more of the shareholders (30.7%) considered the profit and loss account to be of maximum importance than held the same view about the financial newspaper reports (21.2%). Far fewer of the respondents, however, held the view that the financial press was irrelevant for investment purposes. Just under one in nine (11.6%) rated the financial newspaper reports as being of no importance compared to one fifth (20.7%) who held a similar view about the profit and loss account.

Another interesting observation from the table is that stockbrokers' reports, which were not read by over one third of the responding shareholders, were rated second in the hierarchy of importance (albeit in the moderate to slight importance category). This tends to give weight to the supposition that the attention paid to the merger reports was due more to the topical interest of these reports rather than to long term decision making activity. One third of the shareholders (31.2%) however, did not consider stockbrokers' reports to be relevant for decisions about their portfolio. A similar proportion (33.1%) held the same view about six monthly financial reports issued by companies. Clearly, it seems that many of the shareholders simply ignore the interim reports for decision making purposes - only 27.5% considered them to be of great or maximum importance for investment decision making.⁵

The Extel cards and Moodies' handbook appeared to be too sophisticated or inaccessible for most of the responding shareholders, and these aids to investment decision making were consequently rated poorly - 75.4% of respondents stating that Moodies' and Extel's services were of no importance to them for investment purposes.

Looking at the sources of information considered to be important by the various types of shareholders, a certain pattern emerged (see Appendix 3 for full details). All groups considered newspaper reports to be the most important information source. The older respondents, and those with little or no knowledge of accounting, rated the stockbrokers' reports as being second in importance to articles in the financial press. Qualified accountants and financial managers, how-

⁵R. G. May, 'The Influence of Quarterly Earnings Announcements on Investor Decisions as Reflected in Common Stock Price Changes', *Empirical Research in Accounting: Selected Studies*, 1971, pp. 119-63 concluded, however, that there is a significant demand for quarterly accounting data and that, judging from his finding that relative price-change responses to quarterly earnings are not significantly less than responses to annual earnings, investors may be unaware of, or unable to take account of, the difference in quality of quarterly and annual accounting data.

ever, were more concerned with company interim reports than with information from stockbrokers. This would appear to give yet another indication that company accounting statements may only really be appreciated by those with knowledge of the accounting process.

Useful information found in sources other than the annual report

In order to ascertain the reasons for reading reports other than the annual financial report, respondents were asked an open-ended question which sought to discover which particular pieces of information from these sundry sources they found useful when making investment decisions. The answers are shown in Table 6 below (106 shareholders did not answer this question).

The table shows clearly that yet again the future prospects of the company dominates all other items, at least in this survey.* Obviously, the fact that information on the company's future was mentioned by almost twice as many respondents as the next item

*In total 27.5% of the respondents stated that information on either the company's future prospects or its development and expansion programme was useful to them.

TABLE 6
Information derived from sources other than the annual accounts found to be useful by the shareholders when making investment decisions

	%
Future prospects (contracts; production plans; future demand)	24.3
Income data (profit performance; trend)	12.3
General trend information (past record; growth; past trends - unspecified but excluding income and dividend trends)	11.0
General information about the company (company activities; labour; geographical spread)	9.9
Investment guides (return on capital; price earnings ratio, etc.)	9.6
Dividend information (dividend cover; prospects)	7.5
Solvency; liquidity	7.2
Company development and expansion (mergers; capital investment)	7.2
Management (quality; ability)	6.1
n=374	

indicates the importance attached to such news by a large proportion of these shareholders. At a time when the effects of share price fluctuations can offset the income received from dividends, it is not unduly surprising to find shareholders concerned more with a company's future - especially when there is evidence that past earnings growth and dividend growth may have little influence on share prices.⁶

The other items in the table are basically similar to those shown in Table 3. Shareholders appear to be seeking similar information from annual and other reports. Shareholders looking for income information appeared to examine the interim statements and the financial press for such details. Exactly half of the respondents who required income data believed that interim reports were of maximum or great importance, (compared to 27.5% of the total sample holding this view) and 56.5% of them rated the financial press as being of equal importance (compared to the sample average of 51.0%).

The financial press appeared to be the medium used by those seeking information on the company's future prospects but the percentage of shareholders (50.5%) requiring details on the company's future and who rated the financial newspapers in the two highest categories of importance was no more than the sample average. General information about the company, however, was almost certainly found in the press: 67.6% of the respondents interested in general news about the company rated the financial newspapers as being of at least great importance.

The respondents who had had more training in accounting were more interested in most of the items shown in the table than the other shareholders - especially in the future prospects of companies and profit information. Few other differences were noted apart from the fact that few female shareholders, compared to their male counterparts, found the items in the table useful to them in investment decisions. (22.2% of the female respondents stated, without being asked, that they relied upon professional advice for investment decisions. Only 8.6% of the men relied upon outside assistance.)

Summary and conclusions

This paper looked at the manner in which certain private shareholders use company annual financial reports and outside sources of information.

The general findings of the study are as follows:

i Many of the respondents appear to skim

⁶See, C. J. Jones, D. P. Tweedie and G. Whittington, 'The Regression Portfolio: A Statistical Investigation of a Relative Decline Model', *Journal of Business Finance and Accounting*, Autumn 1975 (forthcoming).

ACCOUNTING AND BUSINESS RESEARCH

through the annual report - the chairman's report being the most widely read section. Those shareholders with some form of training in accounting read the report more carefully than those without any such experience and paid particular attention to the profit and loss account. Those with no knowledge of accounting were more interested in the chairman's report than any other section, and this was confirmed when these respondents rated the chairman's statement the most useful part of the annual financial report for investment decision making purposes. Those with accounting or financial experience rated the profit and loss account and balance sheet as the most useful sections.

2 Financial press reports were considered to be the most important of the sources of information other than the annual financial report. Shareholders even rated the financial press as being slightly more useful in investment decision making than the published profit and loss account. Six monthly interim accounts were only considered to be of moderate to slight importance - one third of the respondents considered these reports to be of no use to them for investment decisions, although those with accounting experience rated them more highly than those without accounting experience.

3 The economic prospects of a company were considered to be the most important item of information contained in both the annual report and the other sources of information.

Two major implications arise from these results. Firstly, it would appear that shareholders are very interested in information about the future of the company - at present not necessarily provided by the company. Secondly, shareholders without a knowledge of accounting seem to prefer to consider an interpretation of the company's results rather than the published statements themselves. (A study of the reading pattern of different shareholders will be given in a later report.)

Many authors have suggested that companies should provide projections of the future. Cooper *et al.*⁷ for example, have suggested that companies should disclose budgetary data as an extension of corporate reporting. Lee⁸ has proposed that cash flow forecasts should be shown in addition to conventional financial statements. There are, however, difficulties in reporting forecast data. Some authors have indicated that

⁷W. W. Cooper, N. Dopuch and T. F. Keller, 'Budgetary Disclosure and Other Suggestions for Improving Accounting Reports', *The Accounting Review*, 1968, pp. 640-48.

⁸T. A. Lee, 'A Case for Cash Flow Reporting', *Journal of Business Finance*, Summer 1972, pp. 27-36.

evidence does exist to show that forecasting techniques may not be sufficiently well-developed at present to enable investors to obtain full benefits from the forecasts, due to their inaccuracy.⁹ Other writers mention the concern of accountants and financial analysts that forecasts may be misinterpreted by the general public.¹⁰

Obviously, shareholders may have to be alerted to the dangers of taking forecasts at their face value and, as a safeguard, either the reporting accountant may have to report on the main assumptions and estimates underlying the forecast and/or the company's financial statements¹¹ and may need to report on the accuracy of previous forecasts.¹² The demand from shareholders, backed by many reporting accountants and financial analysts,¹³ for forecast information does, however, seem to indicate that the present lack of such information should be remedied to give the maximum utility to the user of financial reports.

Not only forecast information is required. At present it appears that many shareholders may rely upon the company's chairman to interpret its financial statements in his report, due possibly to their inability to understand the accounts (evidence of this is to be sought in the interview survey). This places a heavy responsibility on company chairmen - one which is not enforced by statute and which relies to a great extent on the discretion of the individual chairman. In addition, their statements are not subject to independent audit report. To satisfy the differing needs of investors it would seem to be beneficial if simplified versions of the profit and loss account and balance sheet, in addition to the present information, were to be provided for shareholders.¹⁴ Additionally, certain basic ratios could be shown and their significance reported on by the directors, their comments and the simplified accounts being attested to by the auditor.

In these ways the company could present a report to its shareholders which would perhaps meet their information needs more adequately - a report which would not only satisfy the need of many of them for

more information about the company's prospects but possibly also give some shareholders a much more comprehensible picture of the company's past year's trading and its present state of affairs, than they receive at present.

Acknowledgement

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We are also grateful to the chairman, board of directors and auditors of the public company concerned in this study for their permission and help in identifying the shareholder population to be surveyed. We hope the results will be useful to them as well as to all members of the accountancy profession and company management.

APPENDIX 1

Details of the background of the shareholders respondents: n = 374

		%
<i>Sex</i>	Male	80.5
	Female	16.8
	Unknown	2.7
		100.0
<i>Age</i>	Under 31	4.3
	31-50	24.9
	51-64	36.8
	65 +	31.6
	Unknown	2.4
		100.0
<i>Accounting Experience</i>	Qualified Accountant	7.0
	Financial Management	18.7
	Courses in Accounting Taken	5.3
	Book-keeping Experience	15.8
	None	50.3
	Unknown	2.9
		100.0
<i>Occupation</i>	Retired	28.3
	Financial Managers	13.9
	Engineers/Architects	10.4
	Housewives	9.4
	Investment Managers/Brokers	4.3
	Accountants	3.5
	Medical Practitioners	3.5
	Educationalists	2.9
	Others	18.7
	Unknown	5.1
		100.0

⁹See, for example, R. A. Daily, 'The Feasibility of Reporting Forecasted Information', *The Accounting Review*, October 1971, pp. 686-92; and S. Dev and M. Webb, 'The Accuracy of Company Profit Forecasts', *Journal of Business Finance*, Autumn 1972, pp. 26-39.

¹⁰See, R. J. Asebrook and D. R. Carmichael, 'Reporting on Forecasts: A Survey of Attitudes', *The Journal of Accountancy*, August 1973, pp. 38-48; and K. F. Skousen, R. A. Sharp and R. K. Tolman, 'Corporate Disclosure of Budgetary Data', *The Journal of Accountancy*, May 1972, pp. 50-7.

¹¹See, Asebrook and Carmichael, op. cit., pp. 42-6.

¹²See, Lee, op. cit., p. 32 and Cooper *et al.*, op. cit., p. 646.

¹³See, Asebrook and Carmichael, op. cit.

¹⁴See also, Baker and Haslem, op. cit., p. 69.

APPENDIX 2
Importance rating of sections of the company annual financial report by type of shareholder

	<i>Accounting Experience</i>			<i>Sex</i>			
	<i>Qualified accountant</i>	<i>Financial manager</i>	<i>Courses in accounting</i>	<i>Courses in book-keeping</i>	<i>No accounting knowledge</i>	<i>Male</i>	<i>Female</i>
Chairman's report	2.52	2.43	2.47	2.81	2.95	2.65	3.36
Report of directors	3.40	3.06	2.95	3.74	3.66	3.43	3.86
Profit and loss account	2.04	1.91	2.68	2.81	3.02	2.63	3.36
Balance sheet	2.24	2.19	2.84	3.24	3.49	2.89	3.93
Auditor's report	3.80	3.61	3.32	4.13	4.11	3.88	4.27
Notes to accounts	3.24	3.01	3.26	3.83	4.02	3.64	4.45
Statistical data	3.24	3.09	3.47	3.94	3.97	3.69	4.27
<i>Occupation</i>							
<i>Retired</i>	<i>Housewife</i>	<i>Manager/accountant</i>	<i>Investment</i>	<i>Other</i>	<i>Under 31</i>	<i>31-50</i>	<i>51-64</i>
Chairman's report	2.39	3.27	2.60	3.01	3.53	2.93	2.85
Report of directors	3.17	4.07	3.40	3.65	3.93	3.42	3.81
Profit and loss account	2.38	3.60	2.33	2.85	2.73	2.66	2.87
Balance sheet	2.95	4.07	2.40	3.33	2.73	2.97	3.26
Auditor's report	3.74	4.63	3.88	3.99	3.93	3.98	4.11
Notes to accounts	3.38	4.60	3.35	3.94	3.33	3.67	3.95
Statistical data	3.64	4.60	3.93	3.80	3.93	3.63	3.94
<i>Age</i>							
Chairman's report	2.39	3.27	2.60	3.01	3.53	2.93	2.85
Report of directors	3.17	4.07	3.40	3.65	3.93	3.42	3.81
Profit and loss account	2.38	3.60	2.33	2.85	2.73	2.66	2.87
Balance sheet	2.95	4.07	2.40	3.33	2.73	2.97	3.26
Auditor's report	3.74	4.63	3.88	3.99	3.93	3.98	4.11
Notes to accounts	3.38	4.60	3.35	3.94	3.33	3.67	3.95
Statistical data	3.64	4.60	3.93	3.80	3.93	3.63	3.94

APPENDIX 3
Importance rating of sources of financial information by type of shareholder

	Accounting Experience			Sex			
	Qualified accountant	Financial manager	Courses in accounting	Courses in book-keeping	No accounting knowledge	Male	Female
Six monthly financial reports	3.04	2.84	3.10	3.33	3.71	3.29	3.96
Financial press reports	2.56	2.30	2.60	2.51	2.73	2.50	3.04
Occasional merger reports	3.44	2.99	3.20	3.42	3.70	3.40	3.84
Moodies/Extel cards	3.62	4.24	3.85	4.39	4.68	4.33	4.80
Stockbrokers' reports	3.44	3.18	3.10	3.23	3.21	3.16	3.49
<i>Occupation</i>							
	Retired	Housewife	Manager/accountant	Other	Under 31	31-50	51-64
Six monthly financial reports	3.03	4.10	3.25	3.62	3.56	3.36	3.39
Financial press reports	2.37	3.28	2.48	2.89	2.63	2.64	2.54
Occasional merger reports	3.29	4.00	3.28	3.59	3.75	3.44	3.35
Moodies/Extel cards	4.43	4.93	3.94	4.58	4.00	4.19	4.42
Stockbrokers' reports	2.94	3.41	3.25	3.36	3.81	3.44	3.09
<i>Age</i>							
	Retired	Housewife	Manager/accountant	Other	Under 31	31-50	51-64
Six monthly financial reports	3.03	4.10	3.25	3.62	3.56	3.36	3.39
Financial press reports	2.37	3.28	2.48	2.89	2.63	2.64	2.54
Occasional merger reports	3.29	4.00	3.28	3.59	3.75	3.44	3.35
Moodies/Extel cards	4.43	4.93	3.94	4.58	4.00	4.19	4.42
Stockbrokers' reports	2.94	3.41	3.25	3.36	3.81	3.44	3.09

Holding Gains on Long-Term Liabilities

A Rigorous Analysis

John R. Grinyer

Introduction

The subject of the calculation and disclosure of holding gains on long-term liabilities under General Purchasing Power adjusted accounts seems to have generated both academic controversy and confusion in the minds of some practitioners. Perhaps this is understandable because the discussion has, in the past, appeared to require an intuitive leap to acceptance of a 'gain' generated by inflation, the existence of which gain has been challenged - e.g. by Professor Gynther¹ on the grounds that the 'gain' is not generally available for distribution as dividend. Most of the discussion has focused on the measurement of a profit based on the concept of changes in net asset value, and hence incorporating concepts of asset valuation.

This paper is based on the concept of a profit figure derived by matching historical costs expressed in terms of constant general purchasing power and revenue similarly expressed. Such a concept is not only in accord with traditional accounting practices and conventions presumably adopted because the resulting information output was perceived to be useful, but is also supportable by theoretical argument² the presentation of which is outside the scope of this paper. Valuation will not, therefore, enter into the discussion. It is, however, necessary to assume that 'matching' is best done for finance costs by matching financing charges with the period having use of the finance.

It has been well argued elsewhere³ that any general index of inflation is likely to be inappropriate to each

individual shareholder because his consumption pattern is different from the one on which the index is based. Even if such arguments are valid, it can be claimed that accountancy is an art of the possible and this paper proceeds on the assumption - at present considered by the writer to be justifiable - that a general index can be found the use of which better indicates cost in terms of foregone shareholder real consumption than either the use of specific indexes relating to the firm's existing assets or the use of unadjusted historical cost. In an uncertain world with widely diverse individual behavioural patterns it seems impossible to find one accounting measurement practice which will be 'best' for everyone. Our task is surely to find one which is usually better than those currently employed and from that base to move forward in search of yet better concepts. The use of current purchasing power accounting is therefore assumed to be acceptable in most respects.

This paper rigorously defines the nature of holding gains on long-term liabilities, the manner in which they would be calculated and disclosed in the accounts under certainty (and the above stated matching conventions) and the conditions necessary to the valid use of the approach generally advocated, for the calculation of such gains, by the professional accountancy bodies.⁴ As outlined above, the analysis proceeds on the assumption that it is valid to use a general price index to derive figures of cost and revenue which will be 'matched'. A further assumption is that the *rate of real* interest is constant, in respect of each individual contract, for each year involved in a financing transaction. Obviously real rates of interest do change over time and if expectations of such changes were held at the time of making the borrowing contract it could be realistic to use a

¹Reg. S. Gynther, 'Why use General Purchasing Power?', *Accounting and Business Research*, Spring, 1974.

²J. R. Grinyer, 'The Meaning of Inflation Adjusted Accounts', *The Investment Analyst*, October, 1973.
'In defence of inflation adjusted historical cost', forthcoming article.

³Reg. S. Gynther, op. cit.

⁴e.g. see U.K. Accountancy Institutes' Provisional Statement of Standard Accounting Practice, No. 7, 'Accounting for changes in the purchasing power of money'.

pattern of real cost, over time, reflecting such expectations. It would seem unwise to change that pattern, once adopted, because that could encourage manipulation of accounts in an attempt to balance other items in the statements. On the whole an assumption that, once made, the rate of real interest is constant for all years involved in the transaction seems more acceptable than most alternatives and is adopted here.

Costs of long-term liabilities under certainty

The real rate of interest under a borrowing transaction is a function of the cash flows established by the associated contract and of rates of inflation during the term of the loan. Estimates of that rate may vary during the currency of the loan but, under the assumptions adopted above, the actual rate remains constant because it derives from events which will actually occur and not from estimates of such events. Our concern is to match costs and revenues in real terms, and we find the 'real' cost of long-term borrowing by reference to the real interest rate found by converting relevant money flows into a constant purchasing power and calculating the discount rate which would equate the resulting outflows and the initial inflow, i.e. the rate ' r ' in equation 1.

$$B_0 = \sum_{t=1}^n C_t \frac{I_0}{I_t} \quad (\text{Equation 1})$$

Where B_0 is the amount originally borrowed

C_t is the cash flow associated with the loan in period t

I_0 is the general price index in period 0

I_t is the general price index in period t

n is the time period at the end of which the loan is repaid.

The equation is in terms of consumption power at time '0', but it could equally validly be expressed in terms of purchasing power of any other year with the same solution rate; all that would be necessary to do this would be to multiply the equation by $\frac{I_t}{I_0}$.

It is clear that the real cost r will be different from the 'notional' money interest cost i . This can be illustrated by assuming a constant money interest rate of i over the live loan, a constant compounding rate of annual inflation of f and repayment of money principal at time n . Cash flows will be iB_0 for years 1 to $n - 1$ and $iB_0 + B_0$ in year n .

Equation 1 can then be shown as in Equation 2.

$$B_0 = \sum_{t=1}^n \frac{iB_0}{(1+r)^t (1+f)^t} + \frac{B_0}{(1+r)^n (1+f)^n} \quad (\text{Equation 2})$$

The transaction can be expressed in monetary terms as equation 3.

$$B_0 = \sum_{t=1}^n \frac{iB_0}{(1+i)^t} + \frac{B_0}{(1+i)^n} \quad (\text{Equation 3})$$

Comparison of Equations 2 and 3 yields the result that

$$i = (1 + r)(1 + f) - 1 \quad (\text{Equation 4})$$

$$\text{and } r = \frac{(1 + i)}{(1 + f)} - 1 \quad (\text{Equation 5})$$

Thus the real cost is a function of both the money interest rate and the rate of inflation and if $f > i$ the real interest cost is negative; in effect an interest receipt in real terms is then deducted from the repayment of real principal. Under the assumptions used in Equations 2 to 5 the repayment of real principal takes place throughout the years 1 to n , for in the latter year the final repayment in real terms is less than the amount borrowed in real terms, and the money payment iB_0 includes the repayment of the real principal shown in Equation 6.

$$R = B_0 \left(\frac{1}{(1+f)^{t-1}} - \frac{1}{(1+f)^t} \right) \quad (\text{Equation 6})$$

where R is the repayment of real principal included in the money interest payment. Traditional accounts show the money interest payment iB_0 as a cost, and some Current Purchasing Power account displays retain this convention by treating the repayment of real principal as if it were a 'gain' from inflation. From the point of view of matching costs and revenues such a practice is potentially misleading and the repayment should be deducted from the total payment to identify the real interest cost.

How does the analysis change with the introduction of rates of inflation which vary over time? Equation 2 would then be revised as shown in Equation 7.

$$B_0 = \sum_{t=1}^n \frac{iB_0}{(1+r)^t (1+f_m)^t} + \frac{B_0}{(1+r)^n (1+f_m)^n} \quad (\text{Equation 7})$$

The term $\prod_{m=1}^t (1+f_m)$ means multiply together the terms $(1+f_m)$ for which m takes integer values from 1 to t , e.g.

$$3 \quad \prod_{m=1}^t (1+f_m) = (1+f_1)(1+f_2)(1+f_3),$$

It is not possible to generalise the relationship of i and r , nor of the repayment pattern over time, under varying rates of inflation. Given certainty such rates would be known so r could be calculated. The repayment during period t , expressed in period 0 prices, is then found as R in Equation 8. It can be converted to period t prices by multiplying by

$$\prod_{m=1}^t (1+f_m).$$

$m=1$

$$R = \sum_{j=t}^n \frac{C_j}{(1+r)^{j+1-t}} \prod_{m=1}^t (1+f_m) \\ - \sum_{j=t+1}^n \frac{C_j}{(1+r)^{j-t}} \prod_{m=1}^t (1+f_m) \quad (Equation 8)$$

The first part of the equation calculates, in real terms, the present value at time $t-1$ of future cash flows at that time, while the second part calculates such a present value at time t . It would be possible, under certainty, to separate the annual cash outlays into interest and principal repayment elements and to adjust the accounts accordingly.

The validity of recommended practice

If holding gains are calculated as generally recommended⁵ the gain for year m would be shown, in the currency values at the end of that year, as $f_m B_0$. In limited circumstances that value would be the correct figure to deduct from the conventional money interest cost to derive the real interest cost. It is necessary to identify the situations in which recommended practice would, and those in which it would not, be valid. The reader should recall that the

⁵William D. Bradford, 'Price-Level Restated Accounting and the Measurement of Inflation Gains and Losses'. The Accounting Review, April, 1974 and S.S.A.P., No. 7, op. cit.

ACCOUNTING AND BUSINESS RESEARCH

assumed objective of the accounting exercise is the matching of costs with associated revenues, under an assumption that this is achieved for financing costs if they are apportioned by reference to the volume of funds employed in each period. Re-adopting the assumptions underlying Equations 2 to 6 above, i.e. repayment of money principal at the end of the borrowing period and a constant compounding rate of inflation, we can reason as follows.

Under CPP accounting, and a practice of deducting holding gains from interest costs, the net annual interest cost, I , would be calculated as shown in Equation 9.

$$I = iB_0 - f(B_0) \\ = B_0(i - f) \quad (Equation 9)$$

By substitution of Equation 4 in Equation 9 we obtain equation 10.

$$I = B_0(r + rf) \quad (Equation 10)$$

Now the real interest cost (I^*) expressed in year 0 prices is $rB_0(1+f)^{-(t-1)}$ and this can be converted into the prices of year t by multiplying by $(1+f)^t$ to yield $I^* = B_0(r + rf)$, showing that under the stated assumptions the CPP method generates the same accounting figures as the system of Equations 2 to 6 and can be claimed to be valid.

An arithmetical illustration may aid understanding of the position. Consider a loan made for four years with repayment of all money principal at the end of that period. Let the constant annual rate of inflation be 20% and the rate of annual money interest be 15% (we know from Equation 5 that this combination will generate a negative rate of real interest). The amount borrowed is £1,000. Cash flows will therefore be £150 per annum for interest and £1,000 in year 4 for the money principal repayment. This situation can be shown as in table 1 below, in which the CPP accounting conventions do show the correct answer in real terms because columns d and e show the same figures.

It was observed, above, that it is not possible to generalise algebraically once varying rates of inflation are introduced. Simple simulations can be carried out, however, and show that the generally advocated CPP model is no longer valid for the calculation of real costs of debt finance.

Table 2 shows the outcome with the same data as in Table 1 except that inflation proceeds at the rates

- Year 1 - 20%
- Year 2 - 10%
- Year 3 - 5%
- Year 4 - 0%

Years	Cash flows (a)	£	Real flows at 20% Inf (b)	Real interest and principal outstanding - Year '0' prices (c)		Real interest and principal outstanding - Year end prices (d)		CPP FIGURES (e)			
				Interest cost £	Principal O/S £	Interest cost £	Principal O/S £	Holding gain £	Net Int. cost £	Principal O/S £	
0	+ 1000	+	1000	-	-	-	-	-	-	-	
1	- 150	-	125	- 42	833	- 50	1000	- 150	+ 200	- 50	1000
2	- 150	-	104	- 35	694	- 50	1000	- 150	+ 200	- 50	1000
3	- 150	-	87	- 29	578	- 50	1000	- 150	+ 200	- 50	1000
4	- 1150	-	655	- 24	-	- 50	-	- 150	+ 200	- 50	-

(I) The rate which discounts column (b) to a value of zero is -4.2%, that rate is then the negative real cost of borrowing in this case.
 (II) Column (d) figures are column (c) multiplied by $(1+2)^t$ where t is the year number.

This simple set of data reveals some dramatic errors in the accounting report - in year 1 a net interest gain is shown when a net interest cost was actually incurred. The error inherent in the CPP statement is 180% of the real figure calculated under certainty. Similarly in year 4 the percentage error is equally large, only in that case CPP accounts *overstate* the cost. The scale of these errors is disturbing but is, perhaps, not unexpected. Simulation models, being developed by the author, will hopefully provide more evidence on the robustness of the CPP model.

Practical implications

The above discussion indicates that 'holding gains' are really part of the calculation of the real interest cost, and should be deducted from the annual interest cost normally shown in CPP accounts to better disclose the fact. It is, however, important that they be separately disclosed because the analysis shown in this paper indicates that the generally advocated CPP model is not very robust so far as calculation of holding gains is concerned.

On the assumptions underlying the analysis the CPP model is only fully valid if the same compound rate of inflation applies in all periods, from the time of borrowing to that of eventual repayment of the loan. Such a condition is unlikely to be met in practice, so what alternatives are available to the accountant? Three possibilities are:

- To ignore the holding gain in presenting CPP Profit and Loss Accounts. This seems rather defeatist, but interestingly would lead to less extreme error in a single year than did the use of the CPP model in the circumstances illustrated in Table 2.
- Assume that inflation does proceed at a constant rate and adopt the method usually advocated. In the past this might have been a reasonable approach, but during years which experience unusually high or low rates of inflation, relative to the total period over which a loan extends, the model can fail dramatically.
- Use judgement and build management's expectations concerning future inflation into the calculations. The procedure each year would then be as follows:
 - Forecast rates of inflation to the date of final repayment.
 - Prepare a schedule and calculations as shown in Table 2 for the entire period of the loan - i.e. including past periods.
 - Read from the schedule the principal, in real terms, at the commencement of the accounting period and make a separate adjustment in the accounts for under or over charges in

Years	Cash flows (a)	Real flows Year '0' prices (b)	Real interest and principal outstanding - Year '0' prices (c)	CPP FIGURES				Principal outstanding (g)
				Interest cost	Principal	Interest cost	Principal	
0	+ 1000	+ 1000	-	-	-	-	-	-
1	- 150	- 125	50	925	60	1110	160	200
2	- 150	- 114	46	857	61	1131	150	100
3	- 150	- 108	43	792	60	1098	160	60
4	- 1150	- 830	38	-	53	-	150	+ 100
								+ 150

Real interest cost is 5% – found by discounting column (b) to a zero value

Error in CPP stated figures as a percentage of the desired figures.

	Cost	Principal
Year 1	$\left(\frac{110}{60} \times 100\right)$	$183\% \left(\frac{110}{1110} \times 100\right)$
2	$\left(\frac{11}{61} \times 100\right)$	$18\% \left(\frac{131}{1131} \times 100\right)$
3	$\left(\frac{40}{80} \times 100\right)$	$67\% \left(\frac{98}{1098} \times 100\right)$
4	$\left(\frac{97}{63} \times 100\right)$	$183\% \left(\frac{110}{1150} \times 100\right)$

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4	$\left(\frac{97}{63} \times 100\right)$	$183\% \left(\frac{110}{1150} \times 100\right)$

Error in CPP stated figures as a percentage of the desired figures.

prior periods.

(4) Read the real interest cost from the schedule and include it in the Profit and Loss Account. The balancing item should be the loan outstanding at the Balance Sheet date (this also appears on the schedule) and is shown on the CPP Balance Sheet. This alternative would facilitate the manipulation of the accounts by management, if it wished to do that. Such a feature is likely to be unpopular with accountants, but the likelihood of manipulation could be reduced by requiring firms to provide in their accounts statements of

- (i) the assumptions which they have made concerning inflation in deriving their figures and
- (ii) the outcomes under a range of other assumptions (to illustrate the scale of possible error in the figures).

Information provided under (i) and (ii) could be subjected to audit checks.

The scale of error possible under both alternatives (a) and (b) seems to be such as to justify the sub-

jective approach outlined under (c), despite the obvious problems implicit in it.

Conclusions

Cutler and Westwick⁶ showed that holding gains on long-term liabilities could be a major element in Current Purchasing Power Accounts. This paper has demonstrated that, if generally recommended practices are followed, the gains disclosed could be very misleading during periods of abnormal inflation. The accounting problems generated by inflation will not disappear merely because they are ignored, however, and a proposal has been outlined for an alternative method of calculating the figure of the real cost of borrowing for inclusion in annual accounts. Consideration should now be given to the question of whether the admitted practical problems associated with alternative outweigh its apparent advantages.

⁶R. S. Cutler and C. A. Westwick, 'The Impact of Inflation Accounting on the Stock Market', *Accountancy*, March, 1973.

Some Aspects of the Cost of Debt

Simon M. Keane

The cost of capital, that is the weighted-average of the costs of the individual segments of a firm's capital structure, has been traditionally presented in capital budgeting literature as the basic yardstick for judging the desirability of investment projects, and as an aid in deciding the optimum combination of the firm's long-term sources of funds. Whatever methods are used in the evaluation process, some consideration of the firm's cost of capital will be required. Its measurement, however, has been and remains one of the most difficult and contentious problem areas of finance. In particular, a significant proportion of the literature in recent years has been devoted to the problem of measuring the cost of equity capital in a capital-asset pricing model context, and this has earned the reputation of being the principal stumbling block in the derivation of an operational measure of the weighted average cost of capital. On the other hand, the typically brief text-book treatment of the procedure for computing the cost of debt gives the impression of the absence of any significant controversial issues. Thus, the cost of debt is usually defined as the discount rate which equates the present value of the interest plus principal payments with the net proceeds of the debt issue, that is, the solution for k in the following equation:

$$B = \frac{I}{(1+k)} + \frac{I}{(1+k)^2} + \dots + \frac{I}{(1+k)^n} + \frac{D}{(1+k)^n} \quad (1)$$

where B = net proceeds of bond issue, or market price of bond

I = annual interest payments

D = maturity value of the bond

n = number of years to maturity.

For the purposes of project analysis, in which the cash flows are expressed on an after-tax basis, the relevant cost of debt is usually defined as $k_B(1 - t)$.

Therefore, in the simplest case, where the bond is issued at par and matures at par, the after-tax cost of debt is equal to the coupon rate less the rate of corporation tax.

The purpose of this paper is to demonstrate that this widely accepted definition is an oversimplification, and that although the scope for error in computing the cost of debt is restricted, the problems of measuring it are fundamentally as complex as those

associated with calculating the cost of equity. It will be argued that, in order to derive the overall cost of capital, the relevant cost of a particular debt security is not the promised yield to maturity, but the expected time-adjusted average cost of the series of successive securities of which the particular debt security is one component. If that series can be assumed to be composed of debt securities only, then the cost of debt of any maturity is equal to the expected cost of a perpetuity.

The cost of debt and the length of time to maturity

It is an observable fact that rates of interest differ for equivalent-grade securities according to differences in the length of time to maturity. The relationship between yield and maturity will be influenced by a number of factors, but in particular by the market's expectations of the future course of interest rates.

A two-year bond may have a yield of 5% at the same time that an equivalent-grade seven-year bond may yield 10%. The two-year bond cannot, however, be said to be cheaper *per se* than the seven-year one. Presumably the market's expectations are that after two years, interest rates will rise so that, on average, over the seven year period, a purchaser of a series of short term bonds will earn approximately 10%. There may, of course, be other factors which operate to put the average of the short term rates above or below the 10%, for instance, investors' liquidity preferences or segmentation between the short and medium markets. But, nonetheless, it remains true that the relationship of the two yields cannot be assumed *prima facie* to reflect fundamental differences in cost; otherwise a simple decision rule of issuing only lower yield securities, irrespective of maturity, would commend itself to firms.

For convenience, the subsequent analysis proceeds within the framework of the traditional Modigliani and Miller assumptions of efficient markets and no taxes, etc., where the overall cost of capital can be shown to be unaffected by the degree of leverage. However, this framework is not essential to the argument, and the principles involved are equally valid within a more conventional framework.

Assume there are two firms, M and N, of an

identical risk class, which are expected to earn a perpetuity of cash earnings \bar{X} , such that each firm has a market value V . In addition, both firms have identical capital structures except that the maturity of M's debt is short-term and that of N, long-term, and the interest rate, r_n , on N's debt exceeds that on M's debt, r_m . Therefore

$$V = S_m + B_m = S_n + B_n$$

where S = the market value of the equity, and B = the market value of the debt, and $S_m = S_n$, and $B_m = B_n$.

In the absence of corporate taxes, the weighted average cost of capital for each firm is

$$w = \frac{\bar{X}}{S_u}$$

where S_u = the market value of the equity of an unlevered firm of the same class. Therefore

$$w_m = k_s^m \left(\frac{S_m}{S_m + B_m} \right) +$$

$$k_B^m \left(\frac{B_m}{S_m + B_m} \right) = \frac{\bar{X}}{S_u}$$

$$\text{and } w_n = k_s^n \left(\frac{S_n}{S_n + B_n} \right) +$$

$$k_B^n \left(\frac{B_n}{S_n + B_n} \right) = \frac{\bar{X}}{S_u}$$

Now, if $k_s^m = k_s^n$

$$\text{then, } k_s^m \left(\frac{S_m}{S_m + B_m} \right) = k_s^n \left(\frac{S_n}{S_n + B_n} \right)$$

and therefore

$$k_B^m \left(\frac{B_m}{S_m + B_m} \right) = k_B^n \left(\frac{B_n}{S_n + B_n} \right)$$

and, $k_B^m = k_B^n$

But since $r_m < r_n$, then it follows that r cannot, *per se*, be the relevant cost of debt in determining the firm's cost of capital.

If $k_B^m \neq k_B^n$, then either

- (a) $w_m < w_n$, or
- (b) $k_s^m > k_s^n$.

The first of these alternatives is rejected because it conflicts with the Modigliani and Miller theorem that the cost of capital is independent of the form of financing and because the resulting disparity in firm values would be eliminated by their now celebrated arbitrage process. The second alternative implies that the cost of equity articulates perfectly with the cost of debt, or equivalently that the implicit cost of debt (as measured by its effect on the cost of equity) is inversely related to the yield-to-maturity curve. In

effect, it implies that the total cost of debt (including explicit and implicit costs) is independent of the debt's yield to maturity. If therefore, in practice, the cost of equity is computed on the basis of the firm's debt-equity market value ratio, without reference to the maturity structure of the firm's debt capital, then, to compensate, the cost of debt should be computed independently of its length of time to maturity. That is, k_B does not equal r but, rather, equals the weighted-average of the expected return from the bond and the expected return from the security or securities which subsequently replace it. Therefore:

(1) If the firm intends to replace its dated debt security by another debt security or by a series of debt securities, so as to maintain its existing capital structure, then the relevant cost of the dated security is not its own cost but the expected average cost of the entire series of debt instruments. Unless the management considers itself competent to predict the future course of interest rates, then the best estimate of that expected average is given by the yield of equivalent-grade long-term bonds.

(2) If the firm expects to replace its existing dated debt by equity capital, then the manager is faced with the difficult task of computing the average cost of the debt-equity series. It has to be borne in mind that if the current market yield-maturity relationship for debt securities indicates an expectation of a future increase or decrease in interest rates, then it is reasonable to assume a corresponding increase or decrease in the cost of equity capital, if the latter is perceived as being equal to the rate of interest plus a premium for risk.

(3) If the firm intends not to replace the dated debt with any security, then the relevant cost will be the average of the cost of the existing debt and of the weighted average cost of capital expected to prevail after the debt has been repaid.

This conclusion is based on the observation that if the conventional method of calculating a firm's cost of capital produces solutions which vary according to the maturity structure of the component securities, then the cost of capital as a decision tool must be redefined, so that it can be expressed in maturity terms which are consistent with the needs of the decision. Either cash flows should be discounted at the rate specifically appropriate to the year in which they are receivable, in which case the cost of capital should be perceived as a short-term rate to be computed for each year of the period under review, or cash flows should be discounted at a single time-adjusted average rate, in which case the cost of capital should be expressed as a long-term average rate. Since the cost of equity is generally defined in terms of an indefinite stream of income, and since

most theoreticians favour the convenience of using a single rate for discounting prospective cash flows, then the latter approach is preferred. But whether one or the other is adopted, a debt security's yield to maturity is clearly not the relevant cost for inclusion in the weighted average calculation.

The promised versus the expected rate of interest

The second aspect of the cost of debt capital to be examined concerns the distinction sometimes made in the finance literature between the promised rate of return and the expected rate of return.¹ The promised rate is the rate which solves equation (1), whilst the expected rate is the rate which debt-holders actually expect to receive. If the debt is riskless, then these two rates are synonymous. If the debt is risky, then the promised rate is the maximum rate within the range of possible returns receivable by the bondholder, and, therefore, must be higher than the expected rate since the latter allows for the possibility of default. Some controversy exists about which of the two rates is the relevant one for inclusion in the firm's cost of capital computation. Haley and Schall,² for example, argue that it is the expected return which is the relevant one, whilst in a recent paper Brennan³ argued that, with bankruptcy costs and corporate taxes, it is the promised not the expected cost which is relevant. In fact most textbooks consider only the promised rate. The issue is whether investment projects should be accepted if their expected rate of return exceeds the rate needed to provide the suppliers of capital with the rate which they expect on average to earn, or whether it should at least equal the rate which the firm commits itself to pay to the suppliers of capital.

The problem is more easily put in perspective if we initially make the convenient, albeit unlikely, assumption that a company could be financed entirely by debt, again in the context of the Modigliani and Miller assumption that the capital structure is irrelevant to the firm's overall cost of capital. The issues raised, however, once again, do not depend upon acceptance of the MM framework, but are nonetheless more readily placed in perspective within that context.

The distinguishing features of debt capital as distinct from equity are that,

- (a) the returns are more predictable, and

(b) there is a higher degree of stability in the pattern of returns.

The predictability is achieved by establishing a contractual rate of interest per annum so that the debtholder can ascertain the most likely pattern of cash flows. The variability of that pattern is minimised by attaching to debt a prior claim upon the firm's income, plus a right to look to the firm's assets should the firm fail to meet the contractual rate of interest. The higher the proportion of debt in a firm's capital structure, the more does a debt security lose its predictability and protection from risk, and the more does it assume the characteristics of equity. For a pure debt company, the returns are neither more predictable nor more secure than those of a pure equity company, and therefore the concept of a pure debt company is highly unrealistic. On the other hand, it is a useful artefact for the purposes of focusing upon the similarities and differences between the cost of debt and the cost of equity.

Perfect markets

By perfect markets, it is assumed that there are no bankruptcy costs, and that competition is so effective, both amongst firms for capital projects, and between the debt and equity sections of the securities market, that the firm's overall cost of capital is substantially equal to the expected rate of return from acceptable projects. That is, no firm can find projects whose internal rate of return exceeds its cost of capital k , or equivalently, which have a positive NPV when the cash flows are discounted at k . All acceptable projects have $NPVs = 0$. The cost of capital for a pure debt firm should equal the cost of capital of a pure equity firm of the same class, but unless the firm's asset returns are free of risk, the promised rate for the debt company would be higher than the return expected by the bondholders, and, therefore, by the same token, higher than the return expected by investors in the pure equity company. The minimum equilibrium rate for the promised rate of interest is the highest return included in the market's probability distribution of possible returns from the firm's projects. If it were any less than the highest possible return from the projects then the expected return for the debt would be less than the mean expected return from the projects. Thus, in order to have an expectation of achieving a required return of, say, 15%, the promised rate for the pure debt company might have to be 50%, or even 500%, if there were the remotest possibility of the projects' actual returns deviating to that extent from the expected return of 15%. Indeed, to be assured that every possible return were included, the nominal rate for a pure debt company might be set as high as $\infty\%$, when of course the debt is indis-

¹Boness, A. James, 'A Pedagogic Note on the Cost of Capital', *Journal of Finance*, March, 1964, pp. 99-106.

²Haley, C. W., and Schall, L. D., *The Theory of Financial Decisions*, McGraw-Hill Book Company, 1973, p. 160.

³Brennan, Michael J., 'A New Look at the Weighted Average Cost of Capital', *Journal of Business Finance*, Spring, 1973, pp. 24-30.

tinguishable from equity. But whatever the appropriate promised rate might be, the relevant rate to guide investment decisions would be the expected rate. In perfect markets, lenders would not exercise their right to declare a firm bankrupt for failure to meet the nominal rate of interest as long as there existed the expectation of achieving, on average, the required return. If they sued for failure to earn the nominal rate, no firm would be able to survive for any length of time, because, by definition, it would not be possible to find any projects which offered an *ex ante* average return higher than the return required by the suppliers of capital. The promised rate, therefore, is clearly no more than a mechanism to give bondholders the opportunity of achieving on average the return required by them. It is a device for capturing possible deviations from the mean return, and cannot, therefore, be used as a screening criterion for selecting projects. The effective decision criterion is the expected cost of debt, and the acceptability of projects depends on this rate only. It cannot be observed in the market, and must be assumed to be, like equity, equal to the default-free rate plus, if necessary, a premium for risk. The size of the premium depends on the degree of the firm's nondiversifiable risk, whilst the differential between the default-free rate and the promised rate depends on the total variability of the company. Van Horne⁴ defines the risk premium on corporate bonds as 'the differential between the promised yield and the actual yield on a comparable risk-free security'. It is clear, however, that this is not the case, and that the risk premium is the differential between the expected rate on the risky bond and the risk-free yield. If it were possible for bondholders to diversify all risk away, then bonds should have no risk premium, and the expected rate would equal the default-free rate. But the promised rate would nonetheless exceed the expected rate, because the promised rate is a function of the total variability of the company's returns, whilst the expected rate is a function of nondiversifiable risk only.

Indeed, for the pure debt company the promised rate has to do with the upper tail of the probability distribution of the firm's project returns rather than the dispersion about the mean. Thus the promised rate for a pure debt company A may be higher than that of another pure debt company B even although A has a lower risk total than B. Table 1, for example, gives the distribution of possible internal rates of return for the productive assets held by companies A and B. B is the riskier of the two, but A's assets have nonetheless a small possibility of achieving 19%

as against B's maximum of 18%. The expected rate for each is assumed to be 10%. If no risk premium is required because of the opportunities for diversification, then the 10% will also equal the risk-free rate. But the promised rate for A's debt is 19% and for B's only 18%. At each of these levels the respective bondholders can expect to receive an average of 10% as required. The promised rate has, therefore, no economic significance other than to provide an umbrella under which the return expected by bondholders can be realised, given the particular configuration of the probability distribution of returns from the firm's projects.

Table 1

	A	B	
IRR	Probability	IRR	Probability
1%	.01	2%	.20
10%	.98	10%	.60
19%	.01	18%	.20

Perfect markets with partial leverage

When firms operate under partial leverage in perfect markets, the promised rate of debt will vary proportionately with the degree of leverage and with the variability of the firm's assets. The promised rate will continue to be higher than the expected rate in order to give bondholders the right to receive deviations in returns above the expected rate up to the promised rate, to counterbalance possible deviations below the expected return. Paradoxically, if the realised returns from the firm's assets exactly equal their expected returns, the realised return on the firm's debt will exceed the bondholders' expected rate, and the realised return on the firm's equity will be less than the return expected by the shareholders. Therefore, in order that a portfolio of levered equities should achieve the *ex ante* expected return, it is necessary that the spread of the realised returns be substantially as broad as the spread of the *ex ante* probability distribution of returns from the firm's assets. Just as the necessity for a differential between the promised rate of debt and the expected rate is caused by the variability of the prospective returns from the firm's productive assets, so the possibility of achieving the returns expected from a portfolio of levered shares depends on the actual occurrence of those deviations. Fixed income securities actually benefit from and equity securities suffer from a higher degree of stability *ex post* than was expected *ex ante*. Thus an equity investor who holds shares in two levered companies, each with a significant degree of spread in its *ex ante* probability distribution of returns, will

⁴Van Horne, James C. *The Function and Analysis of Capital Market Rates*, Prentice-Hall, Inc, Englewood Cliffs, N.J., 1970, p. 104.

in fact fail to achieve his required return if each company earns its expected return, even if the returns of the companies were perfectly negatively correlated. He will fare better if one firm does very badly and the other very well, provided of course the average return is no less than the expected return.

To illustrate this counter-intuitive effect of achieving the *ex ante* expected return from the firm's assets, assume that P and Q are two companies whose returns are perfectly negatively correlated, and have probability distributions as follows, for one year hence:

		P		Q	
Event	Probability	Cash	Probability	Cash	
		Flow		Flow	
		£		£	
w ₁	.2	530	.2	1,670	
w ₂	.6	1,100	.6	1,100	
w ₃	.2	1,670	.2	530	

Each company has equity of £500 and a debt of £500, the latter having a promised rate of 11%. The required return for both the equity and debt are assumed to be 10%. The expected returns for a portfolio of debt and for a portfolio of equity are, therefore, as presented in Table 2.

It is clear that if each firm earns the expected return of £1,100 (event w₂) the equity portfolio will earn less than the required return, and the debt portfolio more, namely a return equal to the promised rate. Conversely, if P or Q does badly with the other doing well, the return on the equity portfolio will exceed both the return from the debt portfolio and the minimum return required by the equity-holders.

Imperfect markets

In imperfect markets, the firm's cost of capital and

the expected return from the firm's projects are not identical, and indeed it is a condition of acceptance, under the positive NPV rule, that the latter exceeds the former. The promised rate of interest is, once again, the rate which the market estimates to be necessary to give bondholders an expectation of obtaining their required return, but unlike the perfect market situation, the promised rate for a pure debt company would be less than the maximum possible return included in the probability distribution of returns for the firm's projects, otherwise the debtholders could expect to achieve a return equal to that expected from the firm's projects, which, by definition, under the operation of the NPV rule, would be greater than the return required by them.

If a pure debt company accepts a project which is expected to earn more than the 'cost of capital', i.e. more than the debtholders' required return, then the question may be asked, to whom does the resulting NPV or excess return belong? If the project's IRR is greater than k_B but less than r , then because debtholders are entitled to receive any returns up to the level of the nominal rate r , it might seem that the excess returns would accrue to the debtholders. Indeed, it has already been noted that if every firm achieved the return expected from its productive assets, the debtholders would earn a return equal to r , and would, therefore, secure to themselves the full benefit of the excess returns. However, looking at the whole market portfolio of levered firms, it is extremely improbable that each component firm will earn precisely the return expected from its productive assets, but rather that the pattern of realised returns will conform somewhat to the *ex ante* spread of returns which was contemplated when the market level for r was determined. Each pure debt company has the possibility of earning a return higher than r ,

TABLE 2

Event		P	Q	Portfolio PQ	Probability	Equity	Debt
w ₁	Equity	0	1,115	1,115	.2	223	
	Debt	530	555	1,085	.2		217
w ₂	Equity	545	545	1,090	.6	654	
	Debt	555	555	1,110	.6		666
w ₃	Equity	1,115	0	1,115	.2	223	
	Debt	555	530	1,085	.2		217
						1,100	1,100

and the excess return, if it does materialise, must accrue to the residual owners, who, in the circumstances, are the 'noncontributory' equity owners. In other words, where disequilibrium returns are possible, a company which starts off as a pure debt company, in the sense that all the funds needed initially to purchase its plant and machinery are supplied by bondholders, ceases to be a pure debt company as soon as it accepts a project whose expected $IRR > k_B$. This paradox is a direct result of the residual nature of equity's claim in market conditions which create a divergence between the expected IRRs of acceptable projects and the required rates of return for the capital instruments used to finance those projects.

The significant point for present purposes, however, is that even under imperfect conditions, the relevant cost of capital for determining the contribution which a project makes to the value of the firm remains the expected rather than the promised rate. On the other hand, it is a reasonable assumption that the nominal rate is used by lenders in their evaluation of a firm's capacity to pay the expected rate, although we do not know precisely what criteria are used by them in deciding whether bankruptcy proceedings are justified. It has been argued that under perfect conditions the probability of bankruptcy would be no greater for a pure debt company than for a pure equity company of the same class, because investors in both sections of the security market would be guided only by the prospects of achieving the expected return, which per unit of risk would be the same for each type of security. If under imperfect conditions, the probability of bankruptcy appears to be increased by the degree of leverage, the implication is that leverage leads to premature bankruptcy, because lenders use failure to achieve the promised rate as the signal for action, or alternatively that equity-holders are in fact dilatory in their response to the appropriate signals and permit their firm to continue operating beyond the point where it is justified on economic grounds. Whichever explanation is correct, the promised rate may acquire a more significant role than has hitherto been identified, and a risk-averse management, interested in survival, may use the nominal rate as the relevant hurdle for new investments to minimise the possibility of bankruptcy. But if management wishes to shield the firm against the consequences of bankruptcy, the use of the promised rate as the minimum acceptance rate does not thereby make it the correct rate for measuring the project's contribution to the value of the firm. It is no more than one of a series of measures which they might adopt, such as employing a low level of leverage, or engaging in firm diversification, and which may lead

to a suboptimal position in relation to shareholders' welfare. For example, firm diversification in itself produces no benefit for shareholders which they could not have achieved through their own portfolios, and may lead to the rejection of otherwise profitable projects which might upset the balance of the portfolio. A low debt-equity ratio might reduce the value of the firm as a result of the loss of tax benefits. Lastly, the use of the promised rate as the acceptance criterion might lead to the rejection of projects capable of contributing to the value of the shareholders' portfolios. Nonetheless, it cannot be said that any one of the above strategies affects the return required by bondholders. Whatever screening device is employed by management to determine the acceptability of projects, the magnitude of the contribution which a project makes to the value of the firm can only be measured by discounting the project's cash flows at the return required by the suppliers of capital.

Bankruptcy costs

So far, it has been assumed that no costs are incurred by the firm at the point of bankruptcy. Brennan argues⁵ that such costs, together with the tax deductibility of interest payments, make the promised rather than the expected rate the relevant one. This can only be correct, however, if the promised rate is equivalent to the expected rate plus a premium sufficient to cover the expected costs of bankruptcy, and it is argued that this could be so only if the bonds are riskless, that is, that bankruptcy can be assured of being declared before the value of the firm, *after* payment of bankruptcy costs, falls below a level sufficient to give bondholders their required return. But a risky bond is one which is capable of yielding, after all costs have been paid, a return which is less than the minimum required by the bondholders. Therefore, to compensate, the lender must be capable of earning a rate of return greater than the expected rate plus any bankruptcy premium, otherwise he cannot hope, on average, to achieve the expected rate. It follows that the promised rate must exceed the relevant rate for capital budgeting purposes, and that its function is fundamentally no different from when bankruptcy costs are assumed not to exist, namely to provide an umbrella to capture deviations from the mean. By stating that a rate higher than the bondholders' expected rate is the appropriate one for management to discount the firm's cash flows in order to cover expected bankruptcy costs, Brennan is merely suggesting that the best way to allow for bankruptcy costs is not to include them in the probability distribution of cash flows, but to adjust the

⁵Brennan, op. cit., p. 27.

expected rate upwards so that sufficient returns will be earned to meet the additional costs. Now that may be a useful practical device, but it is no more theoretically valid than omitting the project's installation expenses and then applying a higher discount rate to the subsequent inflows to compensate for the omission. Bankruptcy costs, like the installation costs of a project, or the chairman's salary, should be included in the probability distribution of the firm's cash flows, and, therefore, affect the expected value of the firm, but *per se* they do not change bondholders' required return, which is the rate applicable to the residue of cash flows available to the bondholders from the firm's projects, after deducting all prior expenses. The costs affect the value of the terminal cash flow which the bondholders are entitled to receive, but they do not affect the discount rate which the bondholders apply to that cash flow. Therefore, even with bankruptcy costs, the relevant decision criterion for measuring a project's worth is the expected or required rate.

Taxes

Brennan⁶ also argues that the promised cost is the more relevant cost with corporate taxes, 'since the tax savings from debt issuance depend upon the promised return and not the expected return to bondholders'. But since the promised return is the maximum which the bondholder can hope to receive, then the tax savings associated with that return are the maximum which the firm can hope to achieve. The present value of the tax savings from a bond issued at par is either the value of the promised cash benefits

discounted at the promised rate, $\frac{trB}{r} = tB$, or,

equivalently, the value of the expected cash benefits

discounted at the expected rate, $\frac{tk_B B}{k_B} = tB$.

If we perceive the stream of cash benefits from a project as being composed of two elements, namely

- (1) the after-tax flows expected to arise from the project, computed on the basis that the project is purely equity financed, and
- (2) the tax savings expected to arise from the use of debt capital to finance the project

it is clear that the first stream is unaffected by the tax deductibility of interest payments, and should therefore be discounted at the expected rate, whilst the present value of the second stream equals tB , which

has been shown to equal the value of the expected tax benefits discounted at the expected rate of interest. It follows that the relevant rate, even with corporate taxes, is the expected rate and not the promised rate.

Summary

The conventional definition of the cost of debt as the yield to maturity was examined and found deficient for two reasons. Firstly, the yield to maturity is an expression of the promised rate of interest which is no more than an umbrella rate to ensure that bondholders have the expectation of earning the return required by them. The promised rate is the maximum rate which can be earned by bondholders, whilst the relevant criterion for measuring the value of new projects, and for discriminating between them, is the minimum rate acceptable to bondholders, namely the default-free rate, plus, if appropriate, a premium to compensate for non-diversifiable risk. The cost of debt therefore, like the cost of equity, cannot be directly observed in the market and depends for its derivation on the decision-makers' ability to measure the market price of risk.

Secondly, the weighted average cost of capital as a decision tool in investment appraisal is either one of a series of short-term rates calculated for each year under review or a single long-term average of the future short-term rates expected to prevail during the whole period under review. It cannot be composed of a mixture of redemption yields of securities of different maturities. If the single long-term average approach is adopted, then the relevant cost of a debt security of any maturity is the time-weighted average of its own cost to maturity and of the cost of the securities which are expected to succeed it. If the firm intends to maintain its existing debt-equity ratio, then the effective cost of debt is the expected return from a long-term security of the same class.

It was argued that the existence of bankruptcy costs and tax benefits for debt do not affect the return required by bondholders. Therefore, given the opportunities to construct a well diversified portfolio of bonds, the degree of nondiversifiable risk for any particular bond may be insignificant, in which case the return expected may be assumed to be equal to the default-free rate. In that event, the effective cost of debt for a firm which has achieved its optimal debt-equity ratio, would be equal to the yield of a long-term Government security, whatever the coupon rate of the individual debt security or its length of time to maturity.

⁶Ibid, p. 28.

Capacity Measures and Financial Accounting

Harold Bierman

A comparison of the actual level of operations and the economic capacity of a company is one of the more relevant bits of financial accounting information generally omitted from annual reports. Unless the reader of a financial report has this information, it is difficult if not impossible to estimate the opportunity for expansion for unit sales without additional investment. In addition to the information about the capacity utilisation of the company, information about the capacity utilisation of the industry would also be of interest, though this latter information may be beyond the scope of responsibility of the firm's accountant. While the definition of capacity is difficult for multi-product firms, an attempt should be made to supply this information by product line.

It can be argued that capacity is an economic or production measure and thus perhaps the accountant should not be faulted for its omission. On the other hand, a comparison of the actual activity and the economic capacity is relevant information to the financial analyst and should be supplied along with the other financial information; thus it is reasonable to include it among the reported responsibilities of the accountant.

The relevance of capacity

Figure 1 illustrates the relevance of an industry's percentage of capacity. Assume an industry is operating as shown in Figure 1. The kink in the supply curve arises from the assumption that if the industry is to supply more than Q_c units it will have to build more plant and equipment. The long run marginal cost (LRMC) curve reflects these fixed costs not yet incurred. We define Q_c , the point where the short run marginal cost (SRMC) and the long run marginal cost (LRMC) curves intersect, to be capacity of the industry (or firm).

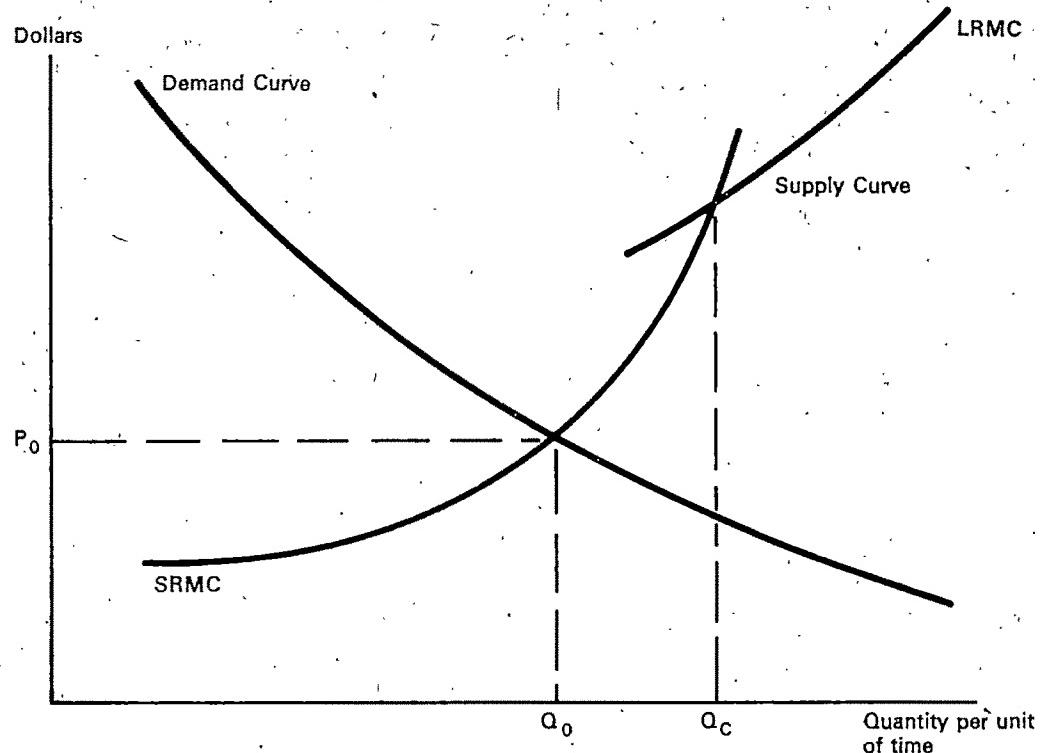
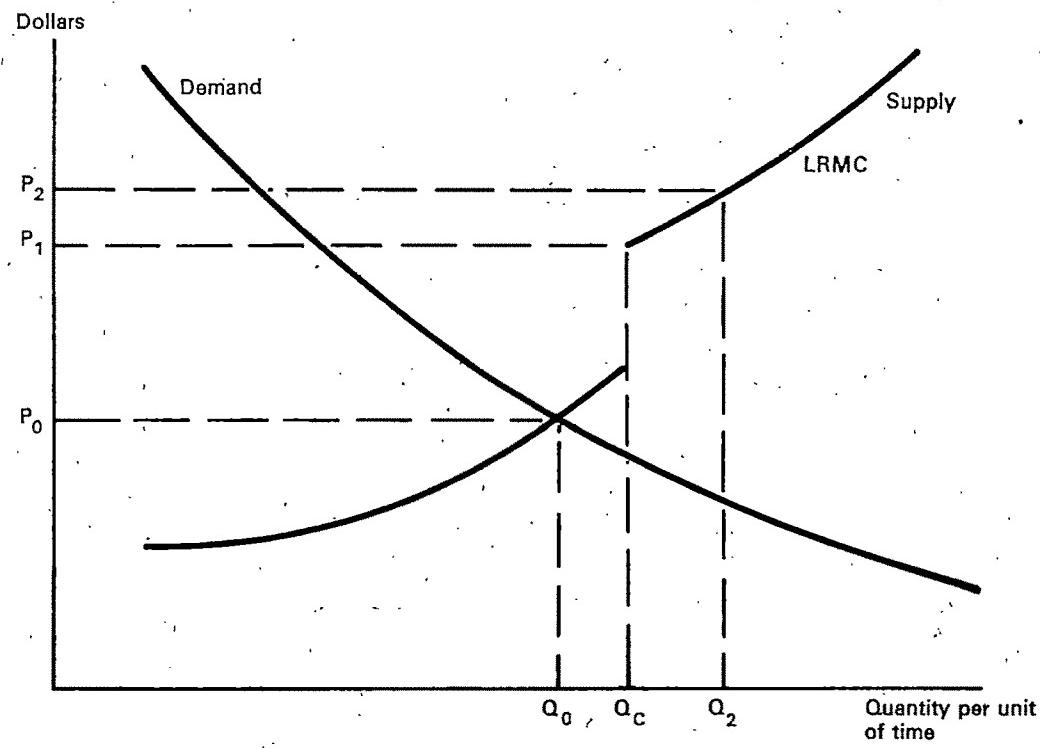
In Figure 1, Q_c , the intersection of SRMC, the short-run marginal cost curve, and LRMC, the long-run marginal cost curve, is the industry capacity.

The two curves differ in that LRMC includes the capital costs (costs of new plant and equipment) that are excluded from the SRMC curve. Both curves will change after the productive capacity has been expanded and the costs of the new plant and equipment become sunk (not relevant) costs.

If the industry has a great deal of excess capacity we can expect the SRMC curve to be relatively flat. A shift in the demand curve to the right would then result in a large increase in output, but only a slight increase in price. As drawn in Figure 1 the SRMC curve increases rapidly and an increase in demand will result in a large increase in price to draw forth a slight increase in physical output. If the industry has a small amount of excess capacity, but a firm has a large amount compared to other firms, then there may be the potential for large profits for that firm.

In some situations the SRMC and LRMC curves may not intersect but rather there is a situation where there is a discontinuity. Using the present facilities no more than Q_c units may be produced because of physical limitations. To produce more than Q_c units requires capital outlays, and a large increase in price to P_1 (see Figure 2).

With the situation shown in Figure 2, if no new facilities were forthcoming a shift in the demand curve to the right would merely result in increased prices since Q_c is the maximum number of units that can be produced without additional capital investments. Only if the price were to increase as high as P_1 would the industry have incentive to add to its productive capacity. The industry capacity situation affects the profit potential of a firm with excess capacity. Assume that the demand shifts so that the price goes to P_2 and output to Q_2 . The firm could expand production (supplying, say $Q_c - Q_2$ units). It would reap windfall profits, or more exactly large 'producer's surplus'. In a situation where an industry had $Q_c - Q_2$ of excess capacity, it would be useful investment information to know which indivi-

Figure 1 Capacity of an Industry.**Figure 2**

dual firms possessed that excess capacity. The amount of industry excess capacity is also relevant since unused capacity tends to limit price increases.

One rule to follow in investing during periods when demand curves are shifting to the right, is to seek out an industry where additional investments are discretionary and that has finite physical capacity that is likely to be exceeded; thus the price is likely to increase. The second step is to find firms in the industry that currently have excess capacity. This strategy implies that you can forecast shifts in industry demand curves and can identify the degree of capacity utilisation by the firm.

Figure 3 shows the profits of a firm with excess capacity (a relatively flat SRMC curve) before (MR_0), and after (MR_1), a shift in the demand curve (represented by the marginal revenue curves). It is assumed that the firm faces sloping demand curves.

MR_0 is the marginal revenue of the firm before and MR_1 is the marginal revenue after the shift in demand. The incremental profits of the firm before the demand shift is the hatched area labelled A and after the demand shift the profits are A plus the area labelled B. The firm profits from the fact that the shift in demand

enables it to sell ($Q_1 - Q_0$) more units and to sell all the units (Q_1) at a higher price. The presence of excess capacity effectively means that the firm can expand output with only a slight rise in SRMC.

The price necessary to attract investment to the industry is likely to be much higher than the price necessary to draw forth more production when there is excess capacity (assuming the SRMC curve is relatively flat). This arises since the SRMC curve excludes the costs of the fixed factors of production (plant and equipment), but the LRMC curve includes these costs.

It is interesting that the high prices used in the investment analysis are apt to be excessively optimistic since once the productive capacity has been expanded the LRMC is no longer relevant since there is a new SRMC curve based on the available resources. This new SRMC curve is then price and output influencing. Thus the price of p_1 shown in Figure 2 may be a temporary price that will be brought down as soon as the new capacity comes on line.

Table I shows a possible interaction on profit potential between industry capacity being used and the percentage of capacity of the firm being used.

Figure 3

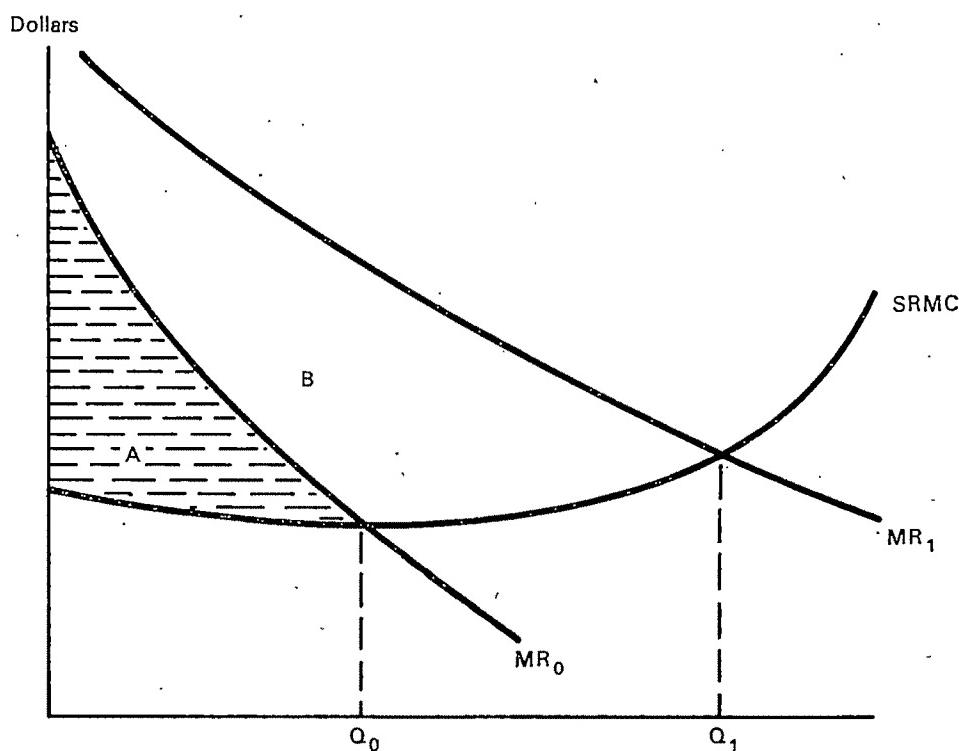


Table I
Profit Growth Potential

	<i>Industry</i>	
	<i>Percentage of capacity being used</i>	
<i>Firm</i>	<i>low</i>	<i>high</i>
<i>Percentage of capacity being used</i>	modest	very high
<i>high</i>	very low	modest

If the industry has excess capacity (low usage) then the outlook of the firm is not good, especially if the firm is producing at near capacity (it will not be able to expand output profitably since the industry has excess capacity). If the industry is operating at close to capacity and the firm has a large amount of excess capacity the profit potential is very large. The firm can expand with no additional plant output but its competitors do not have the capacity for expanding. If the company and the industry are both operating close to capacity then the opportunity for 'easy profit' does not exist, but at least all the firms are in more or less the same position. To produce more there will have to be more investment in plant and equipment.

In 1974 U.S. Steel reported earnings of \$11.72 per share. Should an analyst want to know the amount of excess capacity of the firm and of the steel industry? The company's annual report does

ACCOUNTING AND BUSINESS RESEARCH

indicate that during 1974 the firm operated at a level of 109.8 (this index is based on 1967 being 100) and that 25.5 million net tons of steel products were shipped. A little more information about capacity for expanding unit sales would help the analyst.

If we know that the firm is operating at capacity then further profits are going to come from higher prices, efficiencies, or additional investment. If the firm is operating at less than capacity then additional profits may be earned as well by increasing output.

Conclusions

In selecting common stock during periods when demand curves are shifting rapidly an analyst should be aware of the percentage of capacity currently being used by different firms and industries. The ideal situation for an investor would be where the firm had a large amount of excess capacity, but the industry was operating very close to capacity.

The investor should distinguish between situations where additional investment, if made, will be made based on economic analysis, and where additional capacity will be built because the industry has to react to demand (e.g., public utilities) or where the management of the industry reacts emotionally rather than as a result of economic analysis aimed at maximising profit.

The implications of the analysis of this paper for accounts is that capacity information is a relevant input for financial analysis and should be supplied to the investing community. It is more relevant for decision-making than much information that is currently being supplied.

Empirical Research into Information Utility and Acceptability: A Reply

J. Fisher

I am pleased that my paper dealing with the importance of financial information and the operations of the Accounting Standards Steering Committee¹ brought forth a comment from Professor T. A. Lee² who apparently shares my concern in this important matter.

This reply attempts to clarify three major points he raised concerning my article:

- (1) sample response,
- (2) ambiguity of questions,
- (3) scale construction and data analysis.

Sampling

Lee criticises my sample on three grounds. (1) That it was too small as a sampling fraction of the available users. (2) That it was too heterogeneous, and would have been better concentrated on one particular user group; and (3) That it was too small for the use of means, standard deviations, co-efficients of variations, and chi-square tests.

It would indeed have been possible to carry out a detailed study of one particular user group, but the whole point of my study was that 'it was directed to a broad sample of external users of corporate financial statements, in order to obtain from them an indication of their needs for financial information'.³ If it had been a narrower study, changes in accounting theory and practice might have been proposed based on inbred ideas of some exclusive group; and as a spur to action, the width of the sample was an essential pillar of the research design. In addition I also attempted

to carry out some degree of replication for comparative purposes by incorporating questions and scale constructions from similar studies by Mautz⁴, Brenner,⁵ Estes,⁶ Dyckman⁷ and Trueblood.⁸

As a sampling fraction of available users, what is important is the sampling *method*, rather than the absolute number in the sample. Lee suggests that the population I was aiming at must be in the many tens of thousands, but in fact, if a good sample is drawn, there would be little greater information in covering 50,000 rather than 500. The essential condition to be satisfied is that the individual respondents are chosen in a random manner that allows every individual in the particular population being studied to have an equal chance of being selected. In this case stratified random sampling was used whereby the institutional user population was divided into a number of strata, and then a random sample was selected from each stratum, thus permitting an improvement in the measurement precision which would have been obtained from a simple random sample. Within each of the seven strata the users were selected without replacement from the most recent membership and mailing lists. Half of the respondents from a first mailing also took part in a non-directive interview during which doubtful points were elucidated; and

¹Mautz, R. K., *Financial Reporting by Diversified Companies*, Financial Executives Research Foundation, New York, 1968.

²Brenner, V. C., 'Financial Statement Users' Views of the Desirability of Reporting Current Cost Information', *Journal of Accounting Research*, Autumn, 1970, pp. 159-166.

³Estes, R. W., 'An assessment of the Usefulness of Current Cost and Price-Level Information by Financial Statement Users', *Journal of Accounting Research*, Autumn, 1968, pp. 200-207.

⁴Dyckman, T. R., 'Investment Analysis and General Price-Level Adjustments', *Studies in Accounting Research* 1, American Accounting Association, Chicago, 1969.

⁵AICPA, 'Interview Guide, Accounting Objectives Study Group', *American Institute of CPAs, Chicago*.

¹Fisher, J., 'Financial Information and the Accounting Standards Steering Committee', *Accounting and Business Research*, Autumn, 1974, pp. 275-285.

²Lee, T. A., 'Empirical Research into Information Utility and Acceptability', *Accounting and Business Research*, Spring, 1975, pp. 140-144.

³Fisher, J., op. cit., p. 278.

each interviewee received copies of the questionnaire in his native language in advance of the interview. After one month a second mailing was sent to other randomly selected respondents in order to test for a bias between those who took part in the interview and those respondents who received the questionnaire by mail.

The other requirement of a good sample, is that there should be no indications of bias in those who do respond compared with the non-respondents. So two months later, a third mailing was carried out to a random selection of non-respondents who were requested to provide answers to background questions No. 33 to 36 in order to test for bias between respondents and non-respondents. The overall response rate was on a par with other similarly structured studies and a comparison was made using a chi-square test between first and second mailings, and between first and second mailings and non-responses. The results of these tests shown in Table 1 indicate that there were no significant differences between participants, and that the responses from the two mailings are assumed to be homogeneous and also that the backgrounds of both respondents and non-respondents were similar as regards education, and years spent in evaluating statements.

Lee further states that the answers cannot be relied upon as giving anything other than the views of a very small group of people. I would suggest that the views of 245 respondents are better than fewer, and that the responses should be treated as the views of 245 diverse people. Even the smallest group, the sample of 53 from the United Kingdom, is sufficiently large from a statistical viewpoint to carry out analysis using percentages, means, and some non-parametric tests such as X_2 : 'for some distributions, particularly that of the mean, quite a satisfactory approximation is

ACCOUNTING AND BUSINESS RESEARCH

given by low values of n , say $n > 30$ '.⁹

Perhaps then Lee should have been somewhat more concerned with the whole question of whether or not the European and British samples were also compatible as regards education, training etc. rather than concentrating on sheer sample size, and it is hoped that the following Table 2 will dispel any doubts in this area as well as giving additional information in respect of questions 13, 17, 30.

Questions

As regards question 13(a), Lee states that this question had two alternative meanings, but he does not consider in any depth the purpose of the study; the logic of exploring in considerable depth in the midst of such a study the question of traditional historic cost statements; or that the questionnaire had been explained and pre-tested in the United States, Europe and the United Kingdom. He also omits to link other comments in the body of the article with the study and this becomes more and more obvious as we examine each of his further criticisms. It was stated in the previous article that, 'many interviewees ... suggested that the differing valuation bases could initially be reported by means of supplementary statements',¹⁰ and this is obviously in line with Gynther's description of several sets of statements describing the same situation. Rather than leave this reply in a somewhat untidy manner, it was decided to carry out a thorough test of ambiguity by questioning local institutional users, who were asked to rank Lee's suggestions of statements involving (1) Hetero-

⁹Kendall, M. G. and Stuart, A., *The Advanced Theory of Statistics Vol. 1*, Griffin & Co., London, 1952, p. 224.

¹⁰Fisher, J., op. cit., p. 280.

TABLE 1
 X_2 Test on first, second and third mailings

	Q33 Evaluating Statements	Q34 Qualifications	Q35 Accountancy Training
First Mailing	(n = 246) X_2 35.29 d/f 32 significance .31	(n = 246) X_2 0.56 d/f 2 significance .75	(n = 246) X_2 18.71 d/f 23 significance .71
Second Mailing	(n = 259) X_2 = 22.59	(n = 259) X_2 = 1.94	(n = 259) X_2 = 48.50
Third Mailing	d/f 32 significance .89	d/f 2 significance .37	d/f 25 significance .01

TABLE 2
X₂ Test on European and United Kingdom Responses (n = 131)

Question	Topic	X ₂	d/f	Significance
13(a)	Different Valuation Bases	0.109	1	.74
13(b)	(i) Current Replacement Cost	0.428	2	.80
	(ii) Net Realisable Value	0.511	2	.77
	(iii) Net Present Value	1.492	2	.50
	(iv) Reproduction Cost	4.570	2	.11
	(v) Opportunity Cost	0.687	2	.71
	(vi) Historic Cost and Price Level Index	0.652	2	.72
17(b)	Historic Costs for Reporting	4.549	2	.11
31(a)	Future Expectations	4.681	2	.10
33	Evaluating Statements	26.517	28	.54
34	Qualifications	0.374	2	.82
35	Accountancy Training	16.687	18	.54

geneous mixtures of values; (2) several sets of statements each using a different valuation base; or (3) any other interpretation.

Their replies were tested by means of the Kendall coefficient of concordance which provides a single measure of agreement among several sets of judgements expressed as rankings, and it was found that W (Significance) = 0.884. As W can vary between 0, no agreement and 1 perfect agreement among rankings, $W = 0.8844$ would indicate a strong measure of agreement or concordance despite Lee's fears.

Question 31 dealing with the projections of future expectations was considered by Lee to lack both adequate definition and precision in respect of time periods, and form of information. This question was included in the section of the study dealing with Multiple Measurement, and was made up of two parts, the first asking whether or not this information should be reported, and the second part asking what form the report should take, with possible indications including notes to financial statements; directors' report; published budgets and long-range plans; and statements about short-range expectations.

The following are the various European and United Kingdom responses thereto.

Table 3
Responses to Question 31(b)

Should corporations report projections of future expectations on a periodic basis?

	<i>United</i>	
	<i>Europe</i>	<i>Kingdom</i>
Notes to Financial Statements	5	8
Included in Directors' Report	36	14
Published Budgets and Long-Term Plans	22	20
Statements about Short-Range Expectations	14	9

and as stated in the previous article 'the European respondents favoured firstly the directors' report and secondly published budgets and statements of long-range plans. In the United Kingdom however the same vehicles were favoured but the order was reversed'.¹¹ Lee questions whether such projections should be quantitative or non-quantitative, and it would appear that users would prefer a mix of both. He also appears to be in some doubt as regards the time period involved, but this surely is an oversight on his part. If one takes the following descriptions of the terms 'budget' and long-range plans as contained in a basic text it would appear that the periods covered range from 1 year to 5 years.

'Budgeting is the process of planning the overall activity of the enterprise for a specified period of time, usually a year.'¹²

'A long range plan shows the estimated revenues and expenses and possibly asset acquisitions and other information over each of the next several i.e. three, four or five years.'¹³

In asking this question the respondents were being given the opportunity of voicing their wishes and as an initial question into this whole untapped area of projection reporting it was surely acceptable. The basic aim of the study was to obtain broad impressions and this aim has been met. There is however evidence that points to areas requiring further examination but such future research must not be viewed as being synonymous with instant results.

When examining Lee's criticisms of question 13(b) and the use of the word 'acceptable', it again becomes evident that he does not link this question with question 13(a), which previously asked would *you*

¹¹Fisher, J., *ibid*, p. 280.

¹²Anthony, R. N., *Management Accounting: Text and Cases*, R. D. Irwin, Illinois, 1970, p. 6.

¹³Ibid, p. 497.

favour?; neither does he consider the overall content of the complete article. His assumption that there are 'differing needs and interests' of various users¹⁴ presupposes the answers expected and would appear to be somewhat biased. It is surely necessary that such differences, if there be any, be identified rather than naively accepting a broad impression of their existence. From the χ^2 tests reported in table 2, it would appear that as far as background is concerned there is no reason to believe that the European and United Kingdom respondents are different as the observed distribution of frequencies is within the deviation expected on the basis of choice.

As regards Lee's criticism of the inclusion of 'historic cost updated by a general price index' in this section of the questionnaire, this question was inserted as a result of the pre-testing of the questionnaire at the pilot study stage. The initial respondents to the pilot study suggested that future respondents should at the same time as considering different valuation bases be allowed to reply to what they saw as a further alternative. As this was an examination of various users' views and opinions it was felt that this request was acceptable and would obviate further problems. In the quest for information from non-accounting specialists, especially by means of questionnaires we must not presuppose an accounting expertise and sophistication, and this was further emphasised by Rosen in a summary of a recent study when he remarked

'A very small number in the Canadian business community seem to understand well the difference in effect between a price-level restatement of historic cost and a replacement cost or reproduction cost.'¹⁵

As Lee states, a further in-depth examination of historic cost adjusted statements was conducted by means of other questions, as was the retention of historic costs for reporting purposes (question 17(b)). Perhaps then the criticism is really that the questions were not asked in the order that he would have expected; but in questionnaire preparation there is an obvious need to avoid routine or repetitive answers which can be given without due consideration. It was therefore to avoid such weaknesses and to exclude the respondent from a particular question sequence that the format was adopted, as the final choice of approach and sequence must be determined by specific survey problems and in the light of the results of pilot work.

¹⁴Lee, T. A., op. cit., p. 142.

¹⁵Rosen, L. S., *Current Value Accounting and Price-Level Restatements*, CICA, Toronto, 1972, p. 10.

Scales

While there may be legitimate arguments about the choice of scale method for any particular purpose, there is no evidence to suggest as Lee does that any one method is more applicable than another in providing a true reflection of the general state of opinions. The scales used in my study are perfectly ordinary Likert-type scales used by many other people carrying out similar investigations e.g. Dyckman, Estes, Baker and Haslem.¹⁶ Lee criticises the scales used and states that 'normal' practice dictates a mid-point in the scale which denotes a "neutral" or "undecided" position. One which the respondent can use to indicate he does not have any views on the matter or is indifferent in his views.¹⁷ His criticisms would appear to be as misplaced as his cure, as I already stated there is no *normal* practice in scale selection, and also because the neutral point is not necessarily the mid-point between two extremes. If a respondent states 'undecided' this could mean 'I can not answer' or 'my views lie in the middle' but it would be wrong to use mid-point responses for both. The neutral point is therefore difficult to locate and even more difficult to interpret and in order to overcome this difficulty respondents were given a 'no-answer' opportunity both within certain questions and also in the body of the questionnaire. Lee also implies that a three or five point scale is better than a four point scale in his criticism of the clearly ranked five point importance scale used, in which 'Some' by its position and ordinary meaning lies between 'Little' and 'Great'. There are obvious uses for both five and four point scales which include the avoidance of inhibited answers that select the middle on each occasion but if his suggestion of dropping either point 2 or point 3 were applied where would he place 'undecided'? It would be fatal to say it means more than 'some' but less than 'great'.

Analysis of data

Lee further criticises the analysis of the data, based on an arithmetic mean, and standard deviation. The mean was calculated in order to give a single figure summarisation of the responses and to facilitate comparisons, as well as supplementing the percentage data which was also provided. The choice of one for yes and two for no is totally arbitrary, and in no way can it be seen as 'completely opposite to what it should be'.¹⁸ This codification was chosen for

¹⁶Baker, H. K. and Haslem, J. A., 'Information Needs of Individual Users', *Journal of Accountancy*, November, 1973, pp. 64-69.

¹⁷Lee, op. cit., p. 142.

¹⁸Lee, ibid, p. 143.

consistent computer analysis, and is essential for use in multi-variate regression analysis, it was also made without any prior knowledge of the outcome of the responses. Lee's suggestion that the opposite points scale should be applied is surely a manipulation of figures to suit the findings, as in both cases the essential conclusion that the standard deviation provides remains the same. With raw data of numbers of responses, and percentages the information is neither misleading nor inaccurate and the reader can carry out the analysis and computations as Lee has done in noting the clerical error in question 13(b). If 1 is yes and 2 is no then clearly 1.415 is nearer 1 than 2, no matter how Lee feels that it is a move towards 2. If 2 had been used for yes and 1 for no the mean would have been 1.585 - nearer yes, but surely not a move towards 1.

Conclusion

The extraction of policy from numbers is always

troublesome because of the different weights attached to the findings by different people. The provision of an overall mean, together with percentage data, provides a sufficiently satisfactory basis for comparisons, provided the samples themselves are comparable. From the X_2 tests on background it would appear that the samples are comparable, and as previously mentioned the sample sizes also give a good enough basis for comparability by means of statistical analysis incorporating percentages, means, and X_2 tests, applied to all questions.

I share Lee's concern with the need for change in financial reporting and hope that others involved in this critical area will benefit from this exchange, as constructive replication can only aid the growth and maturity of accounting research. It is however regretted that Lee stopped short of this point as such constructive replication could have contributed to the relevance of the opinions given.

Book Review

Baxter on Inflation Accounting

Accounting Values and Inflation by W. T. Baxter. (Sponsored by The Research Committee of the Institute of Chartered Accountants in England and Wales). McGraw-Hill, 1975, vii + 217 pp. £5.95.

After presiding for more than a quarter of a century over the most successful university teaching department of accounting in Britain, Professor Baxter seems to regard retirement as an opportunity to expand his writing and research activity. The present volume is in many ways a summary of his thinking over the past twenty-five years on the subject of accounting valuation in a period of inflation¹. It is not, however, written in a valedictory style: it is clear, sharp, witty and the product of a lively mind which is still prepared to grapple with new problems. The growing breed of young professors of accounting, many of them former pupils and colleagues of Professor Baxter (who himself was first appointed to a Chair at the early age of 31) will take comfort from his clear demonstration that age and experience can bring maturity and wisdom: the reviewer was certainly persuaded to regard the passage of time in a more favourable light after reading this book.

Professor Baxter's final conclusions on the matter in hand, which are summarised in Chapter 15, are basically that published accounts should be fully stabilised for general price level changes, that specific assets whose price changes are out of phase with changes in the general price index should be revalued by reference to specific price level changes for balance sheet purposes, and that the appropriate valuation basis for such revaluations is deprival value. These conclusions are arrived at after a detailed and meticulous argument, largely developed by reference to apparently simple (but often subtle) numerical examples. The framework assumes that accounting is an art of the possible rather than an exact theoretical science based upon perfect knowledge of a certain future. The approach is both eclectic and pragmatic, and the deficiencies as well as the virtues of the proposed reporting techniques are, for the most part, presented in a clear and balanced manner. Hence the conclusions are both practical and tentative.

In this situation, the reviewer's task is somewhat difficult. If he makes a theoretical proposal, he is likely to be ruled out of order on the grounds of impracticality. If he makes a practical proposal, he is likely to find that the difference between himself and Professor Baxter is one of mere opinion. In this event, he is disarmed by the tentative and unpretentious manner in which Professor Baxter makes his proposals, as well as by the weight of experience and intellectual endeavour which lies behind the making of them. Finally, if he ventures on his own into the dense thicket of Professor Baxter's numerical examples in the hope of finding a different path from that propounded by their creator, he will find the going much harder than he expected and will soon be grateful to return to the officially approved route. However, in a due spirit of humility, the present reviewer found the following areas in which there seemed to be scope for a significant difference of opinion with the author.

(r) *The fundamental problem*

Professor Baxter's fundamental starting point is the problem of inflation, i.e. changes in the general purchasing power of money. This means that throughout the first seven chapters the emphasis is strongly on the adjustment of accounts by general indices and the numerical examples assume away the problem of special price changes, despite the fact that Figure 2.1 (p. 11) amply demonstrates the importance of such changes relative to those in the general index. This means that when the 'Timelag Error' is introduced in Chapter 7, it is seen as a product of changes in the general price level, whereas error can, of course, result from changes in specific prices when the general price level (as measured, for example, by the consumer price index) remains constant. General price level stabilisation recognises one specific price index, that of monetary assets and liabilities which is held constant, giving rise to the controversial gain on monetary liabilities (or loss on monetary assets). Surely, it is inconsistent to recognise this specific change and ignore others: this inconsistency is hidden by making the unrealistic assumption that all other prices rise in proportion to the general index.

This orientation towards general price level stabilisation with specific price level adjustment as a desirable but optional extra, is maintained throughout

¹A useful list of Professor Baxter's earlier writings in the field will be found in H. C. Edey and B. S. Yamey (eds.), *Debits, Credits, Finance and Profits*, Sweet and Maxwell, 1974, pp. v and vi.

the book. (A by-product of the assumption of general price level change is some investment advice in Chapter 6, suggesting equities as a hedge against inflation, which might sound a little naive in the light of specific movements in the equity index after the end of the period described in Figure 6.1.) An alternative, and possibly preferable, approach is that adopted by Edwards and Bell,³ who regard the replacement of historic cost by a current value basis as the fundamental problem of financial accounting, with general price index stabilisation as a desirable but secondary additional adjustment. This latter point is not merely academic: Professor Baxter regards the general index stabilisation recommended in PSSAP7 as a welcome, if incomplete, reform, whereas many, including the reviewer, would regard it as a regrettable attempt to shore up the historic cost valuation basis at a time when general inflation has highlighted its deficiencies, albeit that the deficiencies may continue to exist in the absence of inflation.

(2) Capital and income

Chapter 4 contains a discussion of wealth and income. On p. 25 it is conceded that 'every gain... can be called income', i.e. the distinction between profit and 'below the line' capital gains is somewhat arbitrary and not relevant to all purposes. This is a logical consequence of the sensible assumption that income is derived basically from a comparison of wealth at two different points in time. Later in the book, however, there is a tendency to concentrate on 'above the line' income, and to give rather thin treatment to the assumptions behind the allocation between income and holding gains. This leads Professor Baxter to conclude (p. 181) that 'Asset values should be found by special revaluation, as should costs in decision budgets, etc. But income is better based on the general index, i.e. the latter gives the better cure for the timelag error. If the costs of the income statement are instead corrected with the special index, the real appropriation should be entered as an extra gain, thus restoring the net balance to the level of the general index approach.'

'Income' in this statement is 'above the line' income and the proposal is that special index 'income' should be adjusted to equal general index 'income' by crediting the element of realised holding gain which is included in depreciation under the special index method. This tends to hide the fact that special index adjustment will still lead to a different total income

³E. O. Edwards and P. W. Bell. *The Measurement of Business Income*, University of California Press, Berkeley, 1961.

from that shown by general income if income is now taken to include 'below the line' holding gains in the manner suggested earlier. This is another instance in which the author failed to persuade the reviewer that he had a better solution to that adopted by Edwards and Bell:⁴ an income statement which reports only realised holding gains seems rather narrow.

(3) The special index man

On page 22, Professor Baxter provides us with a table of sub-concepts of income, similar to that drawn up by Professor Gynther:⁵ the concepts are displayed in matrix form, the rows showing asset valuation method, and the columns what Baxter calls the 'comparison unit' and Gynther (with perhaps greater clarity) the 'capital maintenance idea'. On page 25, the distinction is made 'between the "general index" man (who backs the real-change sub-concept) and the "special-index man" (who backs the physical-change sub-concept). The general-index man, in effect, adheres to the historical concept, and merely brings the figures up to date...'. This distinction seems to be unduly sharp: many sensible writers on the subject⁶ (including, it later transpires, Professor Baxter himself) are 'special index' men when it comes to valuing assets and 'general index men' when setting the standard for capital maintenance. Adherence to the physical concept of capital maintenance is not a necessary condition for believing that the historical cost concept is basically incorrect and that assets should be measured at current prices.

The 'special index man' as stylised by Professor Baxter (i.e. an adherent of physical capital maintenance), receives some fairly dismissive treatment in Chapter 8. This special index man is not named in the text, but bears a strong resemblance to Professor Gynther, who may feel that his views have not received a fair hearing. However, on this occasion the reviewer found himself partly in sympathy with the author, and the victim is well known for his ability to take care of himself, so no attempt at defence will be made here. Gynther's review of Baxter should make interesting reading.

(4) Deprival value

The first three 'points of possible disagreement' all relate to the importance and method of treatment of

⁴In this case, the Edwards and Bell proposal referred to is what they describe as 'business profit'.

⁵R. Gynther, 'Why Use General Purchasing Power?', *Accounting and Business Research*, Spring, 1974, pp. 141-157.

⁶The list given by Gynther, op. cit., p. 156, includes Chambers, Edwards and Bell, and Sterling.

holding gains due to the price movement of specific assets. The fourth relates to how the specific price should be calculated. Professor Baxter advocates the concept of deprival value (Chapter 12), a concept which will be familiar to readers of his monograph on depreciation,⁶ and which derives from the work of Bonbright.⁷ The concept was also described in two classic papers by Solomons⁸ and by Wright,⁹ the latter referring to it as 'opportunity value'.

The basis of deprival value is to value the asset at replacement cost or future contribution value, whichever is the lower, where future contribution value is defined as net realisable value or net present value in use, whichever is the higher. It is therefore the value which the firm would put on the asset for insurance purposes, since it measures the minimum outlay which the firm would incur in order to make good the loss of the asset. This measure obviously has some appeal because it avoids certain extremes which might result from the use of other measures. For example, in the case of an expensive but redundant piece of equipment which has high replacement cost but low value in use and low scrap value, the application of deprival value rather than replacement cost avoids the recording of a value which, for most purposes, would seem grossly inflated. Equally, in the case of an asset which is essential for the functioning of an enterprise (such as Solomons' example of the wheels on a railway, Edey's example¹⁰ of the bridge on the railway, or Baxter's example of the tunnel on the railway – the distinguished LSE accounting triumvirate seem to share a passion for railways!) which will inevitably have an extremely high value in use (since the cash inflows of the whole system will be lost if the asset is unavailable) deprival value *may* prevent a valuation on the 'value in use' basis which, in combination with the values of the other assets, would lead to an exaggerated total value of the assets. However, this last situation is only dealt with adequately by deprival value when replacement cost is relatively low (Solomons' wheels): the measure is unsatisfactory, as Professor Baxter concedes, when replacement cost is high (Baxter's tunnel and Edey's bridge).

⁶W. T. Baxter, *Depreciation*, Sweet and Maxwell, London, 1971.

⁷J. C. Bonbright, *The Valuation of Property*, McGraw-Hill, New York, 1937.

⁸D. Solomons, 'Economic and Accounting Concepts of Cost and Value', in M. Backer, (ed.), *Modern Accounting Theory*, Prentice-Hall, Englewood Cliffs, 1966.

⁹F. K. Wright, 'Towards a general theory of depreciation', *Journal of Accounting Research*, II (1964), pp. 80–90.

¹⁰H. C. Edey, 'Deprival Value and Financial Accounting', in H. C. Edey and B. S. Yamey, (eds.), op. cit., p. 79.

The reviewer's anxieties about deprival value spring from three sources:

(1) The justification for it (pp. 124–6) is grounded mainly on a critique of the defects of the practical alternatives (net realisable value or replacement cost) rather than upon the positive merits of deprival value.

(2) Deprival value is a hybrid: it can potentially be one of three measures (net realisable value, replacement cost, net present value in use). Each of these measures has some potential use and it is not clear that the fact that a measure does not reflect a suitable insurance value of the asset is sufficient reason for excluding it from financial reports. For example, Professor Chambers¹¹ might well argue that in the case where net realisable value exceeds replacement cost, the former rather than the latter (replacement cost, which would be selected by the deprival value rule) is the best measure of the assets of the firm from the point of view of the shareholder, since it represents the amount of potential purchasing power locked up in the assets of the firm and foregone as a result of holding these assets. Thus, net realisable value might, in such a case, provide a superior denominator in calculating a rate of return.

(3) The application of deprival value to cash-yielding assets (pp. 137–8) and to monetary liabilities (pp. 138–9), seemed successively to be dubious steps. In the case of assets, which yield cash directly (such as share and loan holdings) it seems likely, in most cases, that these will be separable from the firm without any effect accruing to the value of the other assets, including goodwill, of the firm, i.e. we are free of the problem arising in our triumvirate of railway examples. In such a case, deprival value would indicate the valuation at replacement cost if it were lower than net current sale price or the present value of discounted future receipts, whereas the higher of the latter two values would be the one actually realised by a rational profit-maximising management.

In the case of liabilities (including all fixed-money obligations) Professor Baxter uses the argument for symmetry to justify valuation at what he calls Relief Value. Where:

Relief Value = *the higher of* the replacement loan
which could be raised for the same
money payments
or the net payments necessary to
meet the liability

And

¹¹R. J. Chambers, *Accounting Evaluation and Economic Behaviour*, Prentice-Hall, Englewood Cliffs, 1966.

Net payments to meet the liability = *the lower of* current repurchase price
or the present value of future payments.

The second part of this algorithm is intuitively sensible: the burden of the liability is the cost of redeeming it immediately or the burden of all future payments if it is not redeemed, whichever is the lower. The intuition balks at the first part, however, which states that if, for example, the loan could be redeemed and a larger loan negotiated without altering the burden of future monetary obligations, the larger loan (which has not been negotiated and whose benefits have not been received) should appear as a liability. On the other hand, it is difficult to visualise how, in a rational capital market, the three values used in the algorithm would deviate greatly from one another, so perhaps the problem is not worth great emphasis.

The final impression left by the proposal of deprival value is that the case is not proven, but worthy of further investigation and discussion. The author is humble in the claims which he makes: 'The deprival concept shares the general weakness; but it seems at least to be sufficiently useful and reasonable to merit a trial' (p. 143). An alternative would, of course, be multiple column reporting, such as the provision of a full set of accounts on a replacement cost valuation basis, with a general price index capital maintenance concept, in the style of Edwards and Bell (although the reviewer prefers Professor Baxter's definition of replacement cost in terms of replacing the service to the Edwards and Bell definition in terms of replacing the physical asset), with an additional column in the balance sheet recording net realisable values where these were materially different. This could provide more information than deprival value alone (except in the case where net present value happened to be the deprival value) and would enable the user to choose the valuation basis most relevant to the purpose in hand. It is quite clear that the question of which is the 'best' valuation base remains unresolved, and this may be due to the fact that the question itself is overambitious:¹² different values are relevant to different

purposes, and financial statements are used for a variety of purposes.

Summing up

This is a valuable book. It will be widely read because of its author's undoubted eminence, but it will be re-read many times because of its own merits. It is certainly a book which repays re-reading: its balanced and detailed examination of practical alternatives is much more difficult to digest than the straightforward (but probably less useful) 'A to B' logical argument from a single set of assumptions to a single set of conclusions. The process of reading and re-reading will be assisted by Professor Baxter's style. This is simple, economical, and utterly unpretentious: a pleasing contrast to the excessive verbal jargon or mathematical notation which is imposed on the reader by those writers who are not confident that the efficient communication of their ideas will be sufficient to impress the reader. Baxter's writing is, however, embellished by characteristic shafts of insight and wit; the unusual example, the surrealistic metaphor or the simple aphorism.

Finally, it should be emphasised that the 'areas of possible disagreement' outlined above are not examples of things which are 'wrong' with Professor Baxter's analysis. This book is an exposition of accounting as a practical art, in which a balanced consideration of alternatives followed by a judgement, which is bound to be partly subjective, are the order of the day. Baxter would not claim to have achieved a final solution to the problems of financial reporting: he has given us an excellent account of his own view of the current state of the art. The ablest applied economist I know is accustomed to starting any process of quantitative estimation by asking the question 'If I were to be stuck up against a wall and shot if I were wrong, which number would I choose?' If I were put in a similar position and asked to recommend the best system of financial reporting under current conditions, my answer would not be very different from the one offered by this book... but if so scholarly and openminded a man as Professor Baxter were in command of the firing squad, the problem would not arise!

Geoffrey Whittington

¹²See, for example, the recent debate in *Accounting and Business Research* between Gray and Wells (Summer, 1973 and Spring, 1975), Whittington (Spring, 1974), Macdonald (Autumn, 1974); and Popoff (Winter, 1974). Macdonald comments specifically on deprival value and suggests that it is more useful as a measure of depreciation in the income statement than as a basis for asset valuation in the balance sheet.

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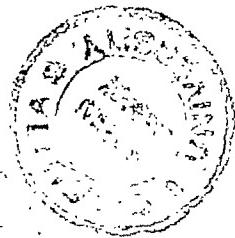
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